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DISEASES OF THE NOSE

AND

PHARYNX.

0

A HANDBOOK
OF
DISEASES OF THE NOSE
AND
PHARYNX.

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PREFACE TO THE FOURTH EDITION.

THE very favourable reception accorded to the three previous editions has induced me to adhere as closely as possible to the original plan and scope of the book. My aim has, all along, been to present, within a moderate compass, such an account of the symptoms and treatment of diseases of the nose and pharynx as might be useful to the practitioner and senior student. Many corrections and alterations have been made, as well as some small additions, but I have abstained, as far as possible, from adding to the size of the book.

UPPER WIMPOLE STREET,
August, 1901.

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DISEASES

OF

THE NOSE AND PHARYNX.

PART I.

GENERAL CONSIDERATIONS.

I. ANATOMY.

THE parts to be described are the following: the **cartilaginous portion** of the nose, the **nasal fossæ**, the **accessory sinuses** of the nose, the **naso-pharynx**, and the **pharynx**. The **pharynx**, from a purely anatomical point of view, includes the whole space between the base of the skull and the lower border of the cricoid cartilage; but the portion of this space situated above the soft palate, which is known as the **naso-pharynx**, stands in closer relation with the nose both functionally and clinically than with the rest of the pharynx, and it is for various reasons more convenient to consider this nasal portion separately. The term **pharynx** is conveniently employed to designate only that portion of the space which is below the **naso-pharynx**.

1. THE CARTILAGINOUS PORTION.

The cartilaginous nose consists of a framework of cartilages and dense fibrous tissue (Fig. 1), covered with integument.

B

It forms, in conjunction with the nasal bones and the nasal process of the superior maxillary bone, the prominent feature of the face. The cartilages are five in number, viz. an upper and lower lateral cartilage on each side, and the cartilage of the septum. Certain small muscles are attached to, and move the cartilages.

The upper lateral cartilage has a triangular shape. At its upper margin it is united with the lower free border of the nasal bone, by which it is somewhat overlapped. In front it is firmly united with the septal cartilage, of which it may be described as a lateral expansion. To the lower border is attached a layer of fibrous tissue which connects it with the lower lateral cartilage.

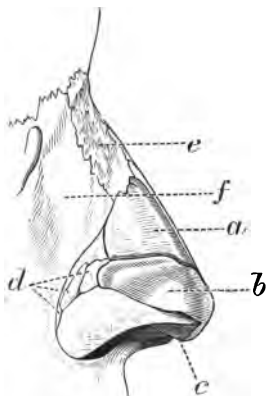


FIG. 1.—Lateral view of the Cartilages of the Nose. (From Quain after Arnold.)

a, Upper lateral cartilage; *b*, lower lateral cartilage; *c*, inner part of the same; *d*, sesamoid cartilages; *e*, nasal bone; *f*, nasal process of the superior maxillary bone.

The lower lateral cartilage (cartilage of the ala), thinner than the preceding, is bent upon itself in front, at a somewhat acute angle, so as to form a portion of the inner and the outer wall of each nostril. The portion in the inner wall meets its fellow of the opposite side in front, with which it is loosely connected. Behind it is separated from that of the

opposite side by the cartilage of the septum, while its free extremity projects slightly into the nostril, forming a prominence just within the orifice. The portion in the outer wall passes backwards, and somewhat upwards, and is connected behind by fibrous membrane with the ascending process of the superior maxilla. In this fibrous membrane are two or three cartilaginous nodules, the so-called **sesamoid cartilages**. The

angular prominences formed by the two lower lateral cartilages in front, with a median groove between, go to make, with the tegumental covering, the tip or lobule of the nose.

The cartilage of the septum is somewhat triangular in shape (Fig. 3). It supports the lateral cartilages, and divides the cavity which they enclose into two parts, and it completes at the fore part the partition between the two nasal fossæ. Its posterior margin is attached to the edge of the descending plate of the ethmoid. The lower margin is received into a groove in the edge of the vomer, and into the median ridge or crest formed by the superior maxillæ. In front it is attached to the nasal bones, the anterior edges of the upper lateral cartilages, and the inner portions of the lower lateral cartilages.

The orifices of the nose, anterior nares, are directed downwards, and are irregularly ovoid in shape, more nearly circular in children than in adults. The partition between the two anterior nares, termed the *columna nasi*, is formed by the inner portions of the lower lateral cartilages which project below the level of the septal cartilage, together with a covering of integuments. The cartilaginous nose contains two cavities termed vestibules, which are narrow above and behind, where they become continuous with the nasal fossæ, but widen out below, at the anterior nares. The outer wall of the vestibule corresponds with the outer portion of the lower lateral cartilage, with some dense fibrous tissue below the cartilage, and the fibrous tissue containing the sesamoid cartilages. This latter part is freely movable, and is known as the *ala* of the nose. On the outer surface of the nose a groove runs backwards and slightly upwards from the lobule

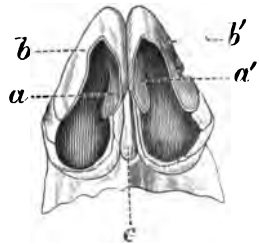


FIG. 2.—View of the Cartilages of the Nose from below.

(From Quain after Arnold.)

a a', Inner parts of the lower lateral cartilages; *b b'*, outer parts of the same; *c*, lower edge of the cartilage of the septum.

(alar sulcus), and curving downwards behind is prolonged on to the face, gradually disappearing towards the angle of the mouth (naso-labial sulcus). The alar groove marks the upper limit of the ala nasi, and the wall of the vestibule is here easily depressed. It corresponds internally with a projection which contracts the cavity of the vestibule above (**limen vestibuli**), and which, when approximated to the septum by muscular action or otherwise, tends to shut off the vestibule from the cavity of the nasal fossa.

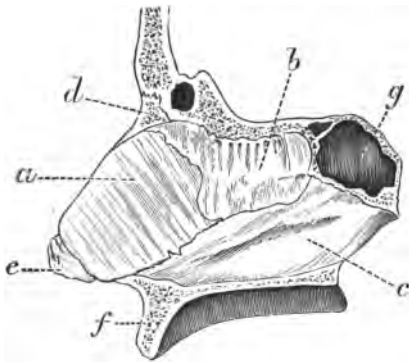


FIG. 3.—Cartilaginous and Bony Septum seen from the left side. (From Quain after Arnold.)

a, Cartilage of the septum; *b*, the perpendicular plate of the ethmoid bone; *c*, the vomer; *d*, the right nasal bone; *e*, inner part of the right lower lateral cartilage; *f*, the superior maxillary bone; *g*, the sphenoidal sinus.

draws up the upper lip and the ala.

The skin on the outer surface of the nose is studded with numerous openings of sebaceous follicles, especially marked in the groove immediately above the ala. The skin is prolonged into the nose so as to line the vestibules, and becomes continuous with the mucous membrane at the lower border of the upper lateral cartilage and the anterior end of the inferior turbinated body. Within the margin of the orifices of the nostrils are numerous short, stiff hairs, **vibrissæ**. Sebaceous

The movements of the cartilaginous part are effected by certain small muscles, six in number. Of these the most important are the **compressor nasi** and **depressor alæ nasi**, which narrow the vestibule; the **dilatator naris**, which enlarges the lower aperture by everting the ala; and the **levator labii superioris alæque nasi**, which

and sudoriferous glands are present in the skin lining the vestibule.

The **arteries** of this region arise from branches of the facial. The **veins** end in the facial vein. The **sensory nerves** are derived from the nasal and infra-orbital branches of the fifth, and the **motor nerves** arise from the seventh.

2. THE NASAL FOSSÆ.

The nasal fossæ are two irregularly-shaped cavities bounded by bony walls, and separated from each other in the middle line by a partition, partly bony, partly cartilaginous. They are lined throughout by mucous membrane, which, owing to its thickness in certain places, and to its closing or narrowing many openings in the bony framework, alters considerably the configuration from that which is found in the dried skull. Each cavity is flattened from side to side, and a roof, a floor, an inner and an outer wall have to be described.

The roof is irregular. The middle is the narrowest part, and is nearly horizontal. It is formed by the cribriform plate of the ethmoid, and is the weakest part of the base of the skull. From this part the roof slopes downwards and forwards, in front, beneath the nasal spine of the frontal and the nasal bones, and still more sharply downwards behind, beneath the body of the sphenoid. The **sphenoidal sinus** opens into the nasal fossa by a circular opening in the posterior part of the roof, nearer the outer than the inner wall, and just behind the superior turbinated bone.

The **floor** of the nasal fossa is formed by the palate plates of the superior maxillary and palate bones, and is fairly smooth. It is very slightly concave from before back, and more decidedly so from side to side. In the floor, about three-quarters of an inch from the anterior naris and close to the septum, there is usually a small, narrow, funnel-shaped recess, the incisor canal, or canal of Stensen, which leads down towards the hard

palate. It marks the upper end of an embryonic communication between the nose and mouth, which, however, is usually closed, at least in its lower part, before birth.

The inner wall is formed by the septum nasi (Fig. 3), which is composed, in front, of the triangular cartilage, and behind and in greater part by the descending plate of the ethmoid and the vomer, and below by the crests of the superior

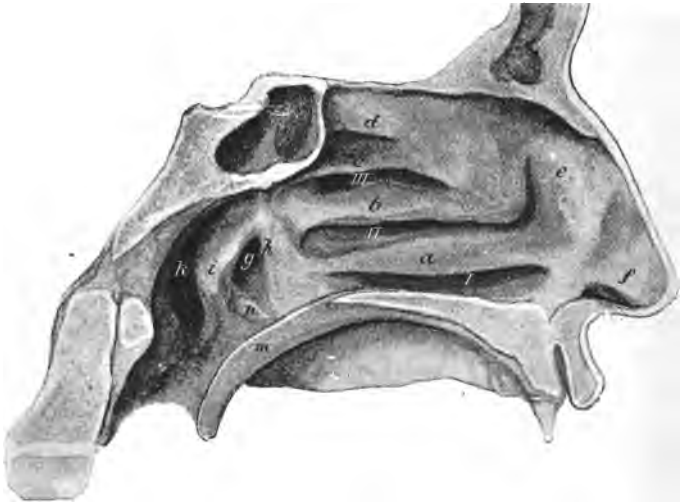


FIG. 4.—Outer Wall of the Left Nasal Fossa.

I., Inferior meatus; II., Middle meatus; III., Superior meatus. *a*, The inferior turbinate body; *b*, the middle turbinate body; *c*, the superior turbinate body; *d*, a fourth turbinate body; *e*, the agger nasi, just below which is the atrium; *f*, the vestibule; *g*, Eustachian orifice; *h*, anterior lip of the Eustachian orifice; *i*, posterior lip of the same; *k*, Rosenmüller's fossa; *m*, the soft palate; *n*, the levator cushion.

maxillary and palate bones. The septum often bulges to one side or the other, especially in its cartilaginous part, and more often to the left side.

The outer wall (Fig. 4) is the most extensive and complicated surface, and several bones enter into its formation.

In front are the nasal process of the superior maxilla, and the lachrymal bone; in the middle, the ethmoid, the inner surface of the superior maxilla, and the inferior turbinated bones; and behind is the vertical plate of the palate bone. It may be regarded as an irregularly flattened surface, with three marked prominences upon it, each having an antero-posterior direction, and situated about equal distances apart. These prominences are the **turbinated or turbinal bones**, so called on account of their rolled-up form. They are also termed **spongy bones** on account of their porous texture. Each consists of a thin plate of bone, which projects into the cavity of the fossa, curving downwards so as to enclose a space. The two upper turbinated bones are portions of the ethmoid; the lower is an independent bone, articulating with the superior maxilla. The **superior turbinated bone** is the shortest of the three. It is situated near the roof, far back, and blends with the middle turbinated bone at its fore part. At its posterior end is a recess or hollow, **sphino-ethmoidal recess** (Fig. 5), opposite which, in the roof of the fossa, is the opening of the sphenoidal sinus. There is a smaller, fourth turbinated bone, above the superior, in about one in every three specimens. The **middle turbinated bone** is larger than the preceding. It commences in the same line behind, but extends further forward. It has a free anterior margin, which has a vertical depth of about half an inch. Its lower margin is thick, so as to have an inner and an outer edge. Running downwards and forwards on the outer wall from the anterior end of the middle turbinated bone, parallel to the nasal bone, is an elevation, usually only slightly marked, termed the **agger nasi**. Below this is a slight depression, termed the **atrium**, which lies between the upper end of the vestibule and the anterior end of the middle turbinated bone. Above the **agger nasi** is a groove which leads to the upper or olfactory region, and is termed the **olfactory sulcus**. The **inferior turbinated bone** is larger than the middle,

commencing in the same line behind, and extending farther forwards. It gradually slopes off into the outer wall anteriorly.

Below each turbinated bone is the corresponding meatus. The superior meatus is very short and narrow, and lies between the under surface of the superior and the upper

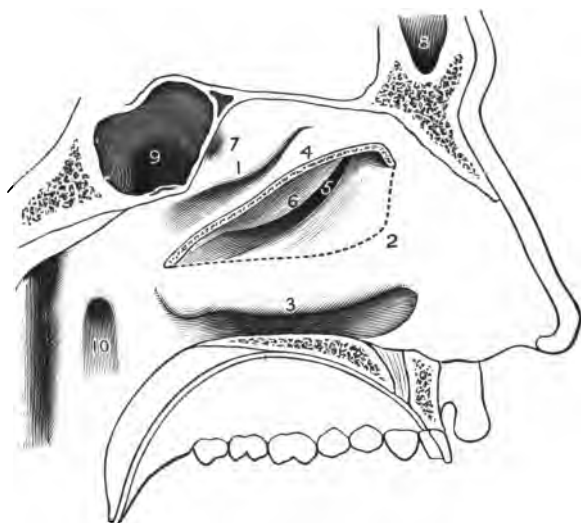


FIG. 5.—Outer Wall of Left Nasal Fossa after removal of the Middle Turbinated Body.

1, Superior turbinal; 2, Dotted line marking the situation of the free edge of middle turbinal, removed; 3, Inferior turbinal; 4, Line of attachment of middle turbinal; 5, Infundibular groove, or infundibulum; 6, Ethmoidal bulla; 7, Sphino-ethmoidal recess; 8, Frontal sinus; 9, Sphenoidal sinus; 10, Eustachian orifice.

surface of the middle turbinated bone. Into it open the posterior ethmoidal cells, usually by a single orifice of variable size.

The middle meatus is the space beneath the middle turbinated body, and corresponds to a surface which extends along the posterior two-thirds of the outer wall of the fossa (Fig. 5). Upon this surface, running downwards and back-

wards, is a semilunar slit, the **hiatus semilunaris** (*Zuckerhandl*). This slit opens into a deep groove in the outer wall, the **infundibular groove**, or **infundibulum**.* This groove, which, like the semilunar hiatus, runs downwards and backwards in the outer wall, is deepest and narrowest above, while it widens out and becomes shallow, and is gradually lost at the lower and posterior part. The boundaries of the semilunar hiatus are formed by portions of the ethmoid bone, the postero-superior (convex) boundary by a hemispherical prominence, the **bullae ethmoidalis** (*Zuckerhandl*), which corresponds to a rather large and constant cell in the bone; the antero-inferior (concave) boundary by the uncinat process. The infundibular groove is of great importance owing to the fact that the frontal sinus, the anterior ethmoidal cells, and the maxillary sinus open into it. According to the width of the semilunar slit, which varies somewhat in different subjects, the openings of the accessory sinuses are more free, or more liable to obstruction from swelling of the mucous membrane at the edges of the hiatus. The opening of the frontal sinus is situated at the upper extremity of the infundibular groove. A little below this an opening is often present leading to the anterior ethmoidal cells. Another, and more constant, opening into these cells is situated above the ethmoidal bulla, in the angle between it and the middle turbinal. Towards the lower and back part of the groove is the rounded, or more often slit-like, opening of the maxillary sinus (**ostium maxillare**). This is usually the only orifice by which the maxillary sinus communicates with the nasal cavity, but occasionally there is a second orifice, much smaller than the preceding (**ostium maxillare accessorium**), situated below and behind it, at the point where the groove widens out and becomes effaced,

* Anatomical writers long ago assigned the name "infundibulum" to the somewhat funnel-shaped ethmoidal cell through which the frontal sinus communicates with the upper extremity of this groove. In most rhinological treatises, however, the term "infundibulum" is applied to the groove bounded by the hiatus semilunaris.

just above the attachment of the inferior turbinal. In the skeleton there is always a large opening at this spot, but the mucous membrane usually covers it completely, and it is probably as a result of absorption of the mucous membrane that the opening exists, since it is very rarely found in young subjects.

The **inferior meatus**, longer than the preceding, is the space between the inferior turbinated bone and the floor of the fossa. At its fore part, concealed by the turbinated bone, is the orifice of the **nasal duct**. This orifice, which varies a good deal in size and shape, is generally situated about the point of junction of the anterior fourth with the posterior three-fourths of the meatus. It may open at the angle of junction of the turbinated bone and the outer wall, or lower down on the surface of the outer wall.

The relations of the various parts of the nasal fossæ will be made clearer by Fig. 6, which represents a vertical transverse section through the fossæ.

The mucous membrane of the nasal fossa, known as the pituitary, or Schneiderian membrane, is highly vascular, and is inseparably united with the periosteum and perichondrium. It is continuous with the conjunctiva through the nasal duct, and with the mucous membrane lining the various sinuses through the orifices above mentioned. Owing to its thickness, the nasal cavities are much narrower in the living subject than in the dried skull, and the turbinated bodies are more prominent. Certain orifices and clefts exist in the dried skull which are closed by the mucous membrane, and therefore have not been described. The membrane is particularly thick over the turbinated bones, especially over the inferior turbinated, and forms prolongations from their free borders and extremities. The term **turbinated** or **turbinal body** is generally used to designate the bone with its soft covering. On the septum nasi the mucous membrane is also very thick.

Two regions must be distinguished with respect to the character of the nasal mucous membrane, viz. the olfactory

and respiratory regions. The olfactory region, in which the olfactory nerve is distributed and the organ of smell located, is of limited extent. Recent investigations have shown that it is confined to the superior turbinated body and the opposed part of the septum (*v. Brunns, Schultze*). The mucous membrane is here covered by non-ciliated columnar epithelium,

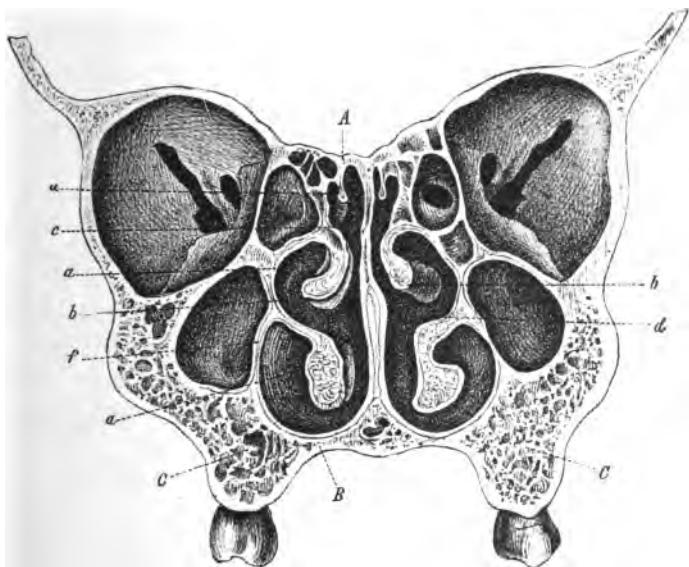


FIG. 6.—Vertical Transverse Section through the Posterior Part of the Nasal Fossa.
(After Zuckerkandl.)

A, The roof of the nasal fossa; *B*, the floor; *C*, the alveolar process; *a, a, a*, the superior, middle, and inferior meatuses; *b*, the middle turbinated bones; *c*, the olfactory region; *d*, the respiratory region.

and has a distinct yellowish-brown colour (*locus luteus*), which, however, may extend somewhat beyond the true olfactory region. Numerous serous glands, of a simple tubular character, with few alveoli, known as Bowman's glands, are present in this region. The respiratory region includes the middle and inferior turbinated bodies, the opposed part of the septum,

and all the lower parts of the fossa. The mucous membrane is thicker and more vascular than in the olfactory region, and is covered with stratified columnar ciliated epithelium, the action of the cilia being in a backward direction towards the nasopharynx. It contains numerous racemose glands, some of which yield a mucous, and some a more watery albuminous secretion. The epithelium also contains many mucus-secreting cells (goblet-cells). Numerous lymph corpuscles are infiltrated in the mucosa, and form, in places, a diffuse adenoid tissue, or nodular accumulations (lymph follicles).

A rich plexus of veins underlies the mucous membrane of the respiratory region. This venous plexus is particularly rich on the inferior turbinated bodies, where the structural arrangement resembles somewhat the erectile tissue in the genital organs, fibrous trabeculæ supporting in their meshes a network of venous channels lined by endothelium, and in some places the venous plexuses are found encircled by bundles of plain muscular fibres. This cavernous plexus, or erectile tissue, as it is termed, is of considerable importance. It is most markedly developed on the inferior turbinated body, and is present to some extent on the fore edge of the middle turbinated, and the posterior extremities of the middle and superior turbinated bodies (*Zuckerhandl*).

The mucous membrane of the septum presents a thickening, due in great part to the abundance of racemose glands, opposite the anterior end of the middle turbinated body, the tubercle of the septum. This thickening narrows the entrance to the olfactory slit from the front.

The arteries of the nasal cavities are derived from the internal maxillary artery, through its sphenopalatine and descending palatine branches, and from the ethmoidal branches of the ophthalmic artery. The veins empty themselves partly into the pterygoid plexus, but principally into the ophthalmic and facial veins. A few veins pierce the cribriform plate of the ethmoid to join veins in the interior of the skull. The

lymphatics * join certain glands behind the pharynx, opposite the axis (retro-pharyngeal), the deep cervical glands beneath the upper part of the sterno-mastoid, and glands beneath the sheath of the parotid. The nerves are of two kinds, viz. the olfactory nerve, and the nerves of common sensation. The olfactory nerve is distributed over the upper turbinated bodies, and the corresponding upper part of the septum. The peripheral filaments of the nerve terminate in peculiar spindle-shaped cells, the olfactory cells, which lie wedged in between the columnar epithelial cells of this region. The nerves of common sensation for the nose are derived from branches of the fifth nerve. The nasal branch of the ophthalmic is distributed on the anterior part of the septum, and on the anterior and upper parts of the outer wall; some filaments, from the anterior dental branch of the superior maxillary nerve, enter the lower meatus, and are distributed on the lower spongy bone, and branches from Meckel's ganglion are distributed to all the remaining parts of the lining of the nasal fossa.

3. THE ACCESSORY SINUSES.

These are air spaces situated in the neighbouring bones and communicating with the nasal fossa. Four sets of cavities are present on each side, viz. the maxillary, frontal, sphenoidal, and ethmoidal sinuses. With the exception of the maxillary, these sinuses are absent in early youth.

The **Maxillary Sinus**, or **Antrum of Highmore**, is the largest of the sinuses. Existing as a mere slit at the moment of birth, it begins to undergo a decided development during the

* Axel Key and Retzius have demonstrated in the nasal mucous membrane a fine network of lymphatic vessels which communicate with the subarachnoid space in the cranial cavity by means of lymphatic channels surrounding the fibres of the olfactory nerve as they pass through the cribriform plate. The lymphatic system also opens on the free surface of the pituitary membrane by means of numberless very fine channels.

period of the second dentition. The cavity has a somewhat pyramidal shape, the apex being directed outwards towards the malar process and the base towards the nasal fossa. Its capacity varies much, the average capacity being about three drachms. Sometimes projecting laminae of bone cross the cavity and subdivide it. The relation of the sinus to the alveolar process is of much practical importance. In certain cases a layer of spongy bone separates the whole extent of the alveolar process from the wall of the cavity, increasing in thickness backwards towards the wisdom teeth, and still more, forwards, towards the incisor teeth, the latter being always the farthest from the cavity. The alveoli of the first and second molars are always the nearest, and mostly form conical projections into the cavity. Sometimes the sinus extends so far into the alveolar process, that the alveoli of all the teeth as far forwards as the canines, and inclusive of these, form little projections in the floor. Occasionally over certain roots the bone may be absent, and the fangs of the teeth may be separated from the cavity only by mucous membrane.

The maxillary sinus communicates with the nose by a small opening, occasionally circular, more usually slit-like, being elongated from before backwards. This opens into the sinus near its roof, and into the middle meatus of the nose towards the lower part of the semilunar hiatus, the margins of which, especially the lower, are here formed by projecting folds of mucous membrane, which are liable to swell and thus impede the escape of fluid from the sinus. A little below and behind this opening a second opening of varying size exists, in about one case in every ten.

The **Frontal Sinus**, situated between the outer and inner table of the frontal bone, resembles in shape a three-sided pyramid, the apex being directed upwards and the base being formed by the orbital plate. It is not present at birth. At seven years of age it is no larger in size than a pea. It develops especially about puberty, attaining its full capacity

about the twentieth year. The sinus is separated from that of the opposite side by a thin septum which frequently deviates to one side or the other.

The depth of the sinus from before backwards is greatest near the septum. At each side of the septum for a short distance outwards the floor of the sinus corresponds to the roof of the nasal fossa, immediately behind the root of the nose. Outside this the floor of the sinus corresponds to the roof of the orbit, reaching as far outwards as the supra-orbital notch, or beyond this. The cavity varies much in size, and the sinuses on the two sides are often unsymmetrical, and one or both may be quite rudimentary or altogether absent. In certain cases the ethmoidal cells, extending further forward than usual, encroach on the cavity, and may form a prominence in the lower part of the sinus (*bullæ frontalis*). Diverticula from the cavity may exist at the upper, outer, or posterior extremities. Bony septa may divide the sinuses into recesses of greater or less size. The frontal sinus communicates with the nose by a canal, the naso-frontal duct, which leads from the floor of the sinus, in a downward and backward direction into the upper end of the infundibulum. The length of this canal varies a good deal. It may be half an inch or more in length, or it may be so short as to hardly constitute a duct.

The **Sphenoidal Sinus** is situated at the posterior part of the roof of the nasal fossa, in the body of the sphenoid, and it corresponds above to the optic commissure and pituitary body. Its size varies much. At birth the cavity does not exist, or at most is not larger than a pin's head. It begins to grow at three years of age, but does not attain any size until after puberty, or towards twenty years of age. It is separated from its fellow by a thin septum, which is often incomplete, and often deviates to one side or the other. Sometimes it is subdivided into upper and lower compartments by prominent ridges of bone. It communicates with the nose by a fair-sized opening near the roof of the sinus, behind the superior turbinated body, in the speno-ethmoidal recess.

The **Ethmoidal Sinuses**, or cells, are situated in the lateral masses of the ethmoid, the spaces on the surface being completed by other surrounding bones, viz. the frontal, sphenoidal, lachrymal, superior maxillary, and palate bones. These cells are not present at birth. They appear, and develop *pari passu* with the frontal sinus. They vary in size and number. They communicate with one another, but form two distinct groups, viz. **anterior** and **posterior**. The anterior cells open into the middle meatus by one or more openings, one being usually situated between the ethmoidal bulla and the middle turbinal, and another in the infundibulum. The posterior cells open into the superior meatus by one or more orifices. The anterior ethmoidal cells are sometimes described as consisting of two groups, viz. **anterior** and **middle**.

The **mucous membrane**, lining the various air spaces, is continuous with that of the nose, but is thinner and less vascular. Its deeper layer is everywhere closely united to the bone, of which it forms the periosteum, and its surface is covered throughout with columnar ciliated epithelium. The mucous membrane of the maxillary sinus is thicker than that of the others, and contains a moderate number of tubular and acinous glands. The frontal and sphenoidal sinus, and the anterior ethmoidal cells, are said to contain a few sparsely-distributed glands.

4. THE NASO-PHARYNX. (Post-nasal space.)

The naso-pharynx is that portion of the pharynx which lies behind the nasal cavities. It has an irregularly cubical shape, and thus a roof, floor, and four walls have to be described.

The roof (fornix pharyngis) lies immediately below the base of the skull (body of the sphenoid), behind the posterior edge of the septum nasi (vomer). It passes insensibly, without any intervening angle, into the posterior wall, and is the seat of the pharyngeal tonsil to be presently described.

The **anterior wall** is limited by the posterior openings of the nasal fossæ, the **posterior nares**, or **choanæ**. These openings are separated by the posterior margin of the septum nasi. This margin is thin in the middle, but widens out above and below. It is slightly concave from above downwards. Below the openings of the posterior nares are the edge of the palate bones and the attachments of the soft palate. The **posterior wall** slopes down without any sharp angle between it and the roof. It is formed by the occipito-atloid ligament and the arch of the atlas in the centre, and the *recti capitis antici* muscles at each side. The arch of the atlas forms a slight transverse prominence in the posterior wall.

The **lateral walls** are in relation with the petrous portions of the temporal bones and the internal pterygoid plates of the sphenoid. At the upper part of each lateral wall is situated the somewhat trumpet-shaped prominence formed by the cartilaginous portion of the Eustachian tube, in which is contained a more or less funnel-shaped depression leading into the tube. The upper boundary of this depression is a prominent curved ridge, the **Eustachian cushion**, formed by the Eustachian cartilage, which, being curved so as to present a concavity downwards, has an anterior and posterior lip (Fig. 4). The posterior lip is the more prominent. From the anterior lip a fold of mucous membrane, **salpingo-palatine**, passes downwards in front of the Eustachian orifice towards the floor of the posterior naris. From the posterior lip a more prominent fold, **salpingo-pharyngeal**, containing some muscular fibres, passes downwards behind the orifice, and gradually blends with the lateral wall of the pharynx, behind the posterior pillar of the fauces. At the lower margin of the depression of the Eustachian orifice is a slight prominence formed by the *levator palati* muscle, and known as the **levator cushion**. The orifice of the tube is somewhat oval, measuring most from above downwards, and is on a level with the inferior meatus of the nose. The Eustachian tube itself has a slit-like

lumen, the anterior and posterior walls being in apposition, except during certain muscular acts. Through the Eustachian tube the mucous membrane is continuous with that of the tympanic cavity, and under certain conditions air can pass to and fro, between the pharynx and the tympanum. Behind the prominence of the Eustachian tube, between it and the posterior wall, is a marked depression, known as **Rosenmüller's fossa**.

The floor of the naso-pharynx can only be said to exist when by contraction of the muscles in this region the naso-pharynx is cut off from the space below. An important agent in effecting this closure is the soft palate, which will be described later on.

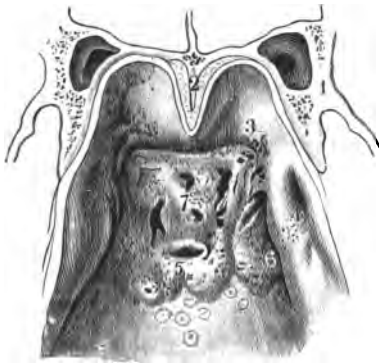


FIG. 7.—Naso-pharynx and Pharyngeal Tonsil.
(After Luschka.)

1, Pterygoid process; 2, vomer; 3, posterior extremity of the roof of the nasal fossa; 4, orifice of Eustachian tube; 5, orifice of the pharyngeal bursa; 6, Rosenmüller's fossa; 7, adenoid tissue, showing depressions on surface.

The mucous membrane of the naso-pharynx is lined with columnar ciliated epithelium (mostly stratified). The lower limit of the ciliated epithelium on the posterior wall varies somewhat. In children it reaches down to the level of the soft palate, but in adults, as a rule, only the upper third of the posterior wall is lined with ciliated epithelium. Islets of pavement epithelium are interspersed with the ciliated epithelium, especially on the posterior surface of the soft palate and uvula. Numerous racemose mucous glands open on its surface. The mucosa is infiltrated with diffuse adenoid tissue, and many lymph

follicles, and leucocytes are constantly passing outwards to the surface, between the epithelial cells.

The lymphoid tissue in the roof is very abundant, and forms a prominent mass, which constitutes the pharyngeal tonsil, or Luschka's tonsil. This tonsil varies in size. It is always well developed in children, but usually atrophies in adult life. The tonsil is divided into numerous folds and elevations by clefts which mainly take an antero-posterior direction. Smaller depressions and cross-furrows also exist, giving to the surface an uneven, pitted character. Often a rounded or slit-like orifice exists, in the middle line, near the posterior part of the pharyngeal tonsil, which leads to a recess of the mucous membrane situated beneath the tonsil. This recess is known as the pharyngeal bursa, and is considered by some to have importance in relation to naso-pharyngeal troubles. It extends upwards behind the pharyngeal tonsil towards the occipital bone, sometimes in the form of a canal, sometimes of a more or less roomy space, with a maximum length of about fifteen millimeters, and a maximum width of six millimeters (*Luschka*). Its interior is lined partly by columnar ciliated, partly by stratified pavement epithelium. There are many lymph follicles in the mucous lining, and numerous mucous glands open on to the surface of the lining near the orifice of the bursa. According to the researches of Schwabach and others, the bursa is merely the remains of the normal median cleft of the tonsil, and its pouch-like form results from a pathological process. In new-born infants and young children the pharyngeal tonsil consists of some six or eight prominent bands or ridges, having an antero-posterior direction, and arranged side by side, across the vault of the pharynx, with furrows or clefts between. As the tonsil develops, the indentations become deeper, especially the median cleft. Later on, owing to inflammatory processes which are common in this region, the ridges of tonsil tissue bounding the median cleft unite, and bridge over a hollow space, which

often, through retention of secretion, lengthens and fills out, and is henceforth demonstrable as the so-called pharyngeal bursa. The bursa is, however, by no means constantly present.

The arteries of the naso-pharynx are derived from the external carotid, through branches of the ascending pharyngeal, the internal maxillary, and the facial. The veins terminate in the internal jugular. The lymphatics enter glands in the substance of the parotid, the retro-pharyngeal glands, and the deep cervical glands near the bifurcation of the common carotid. The sensory nerves are derived from the fifth, principally from the second division, with a few twigs from the third division.

5. THE PHARYNX.

As already mentioned, the pharynx, in the anatomical sense, is the space which extends from the base of the skull to the lower border of the cricoid cartilage. The term is conveniently employed, however, for clinical purposes, to designate the lower portion of the region, below the naso-pharynx, which forms the passage-way from the mouth to the œsophagus, and it is in this sense it is employed here.

The pharynx, as thus defined, is an irregular, somewhat funnel-shaped cavity, the narrow end being directed downwards. The upper boundary is formed in front by the soft palate, and behind this by an imaginary plane, extending back from the free edge of the soft palate to the posterior pharyngeal wall. The lower boundary is on a level with the lower border of the cricoid cartilage and the body of the sixth cervical vertebra. Anteriorly the pharynx is bounded by the cavity of the mouth at the upper part, and below this are the hinder vertical part of the base of the tongue, the epiglottis and the folds of mucous membrane attached thereto, the upper orifice of the larynx and the posterior surface of that organ. The posterior boundary is formed by the anterior surface of the vertebral

column from the axis to the sixth cervical vertebra. At each side of the pharynx are the pillars of the fauces and the tonsil, and the lower part of the salpingo-pharyngeal fold.

The pharynx is much wider from side to side than from before backwards. The widest part is at the level of the great cornu of the hyoid bone, where it measures two inches across. Where it joins the œsophagus, the narrowest part, it measures rather less than three-quarters of an inch across. The anterior and posterior walls of the pharynx are in contact at the lower part, viz. from the arytenoids down to the lower border of the cricoid. At each side of the larynx, within the ala of the thyroid, the pharynx forms a fossa or recess, the pharyngo-laryngeal or pyriform sinus. The distance from the arch of the teeth to the commencement of the œsophagus is about six inches.

For purposes of clinical description, two divisions are recognized in the pharynx, viz. an oral or buccal portion (oropharynx); reaching down to the level of the base of the tongue or the hyoid bone, and the laryngeal portion (laryngo-pharynx), extending from the hyoid bone to the lower border of the cricoid cartilage.

The soft palate (*velum pendulum palati*) is a movable contractile curtain, which is prolonged obliquely backwards and downwards from the posterior margin of the hard palate. It is formed by a duplication of the mucous membrane with muscular tissue and a fibrous aponeurosis between the folds. The anterior surface is concave, and is continuous, without any line of demarcation, with the hard palate. In the middle line is a white linear ridge, or *raphé*, which is continued back from the *raphé* of the hard palate, and indicates the primitive separation of the palate into two halves. The posterior surface, convex from above downwards, is continuous with the floor of the nasal fossæ. It is of a redder colour than the anterior surface. From the centre of the lower margin hangs a somewhat conical projection, the uvula. This structure varies

much in length and thickness. At each side of the uvula, the lower margin of the palate divides into two folds, pillars of the fauces, which diverge from each other as they extend outwards and downwards. The anterior pillar, arising from the base of the uvula, proceeds outwards and downwards to unite with the margin of the tongue just behind the more external of the circumvallate papillæ. The posterior pillar springs from the base and sides of the uvula, passes outwards and slightly upwards at first, and then curves downwards and backwards to blend with the postero-lateral wall of the pharynx. The free edges of the posterior pillars reach nearer the middle line than those of the anterior pillars, so that both pillars are easily seen from the mouth. Between the anterior and posterior pillars is a depression, in which is contained the tonsil. The pillars of the fauces form two contractile arches, the anterior arch constituting the communication between the mouth and the pharynx, the posterior between the nasopharynx and lower pharynx. The anterior arch is termed the isthmus of the fauces. All in front of this belongs to the mouth. All behind and above the posterior arch belongs to the naso-pharynx.

The muscles of the pharynx are four in number on each side, viz. the superior, middle, and inferior constrictors, and the stylo-pharyngeus. The constrictor muscles form the lateral and posterior walls of the pharynx. Arising from various points in front, they pass backwards, in a more or less horizontal direction, to be attached to the fibrous band, or raphe, in the middle line behind. Each muscle partly overlaps the other from below upwards. The superior constrictor arises from the internal pterygoid plate and hamular process of the sphenoid, the aponeurosis of the soft palate, the pterygo-maxillary ligament, the mylo-hyoid ridge of the lower jaw, and the side of the tongue. Its fibres pass backwards nearly horizontally to the raphé, and some of the upper fibres are attached to the pharyngeal spine of the occipital bone. The

middle constrictor arises from the greater and lesser cornua of the hyoid bone and from the stylo-hyoid ligament. The fibres, as they pass backwards to the raphé, diverge upwards and downwards in a fan-like manner, the upper fibres over-

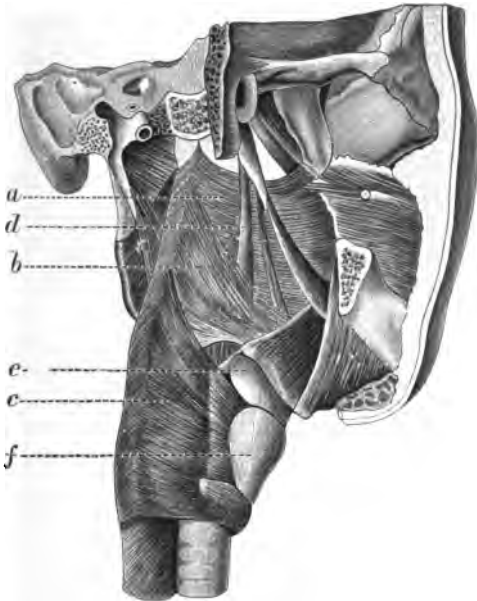


FIG. 8.—Muscles of the Pharynx. (After Sappey.)

a, Superior constrictor; *b*, middle constrictor; *c*, inferior constrictor; *d*, stylo-pharyngeus; *e*, hyoid bone; *f*, thyroid cartilage.

lapping the superior constrictor. The **inferior constrictor** arises from the side of the cricoid, and the back part of the outer surface of the thyroid cartilage. The fibres expand as they proceed backwards, the lower running horizontally, the upper ascending steeply and overlapping the middle constrictor. The **stylo-pharyngeus** muscle arises from the base of the styloid process, and descends forwards and inwards, between the superior and middle constrictor, to be inserted into the hinder

margin of the thyroid cartilage and the hinder wall of the pharynx.

The muscles of the soft palate are the *azygos uvulæ*, *levator palati*, *tensor palati*, *palato-glossus*, and *palato-pharyngeus*. The *azygos uvulæ* (*levator uvulæ*) consists of a pair of slender muscles, at each side of the middle line, attached above to the posterior nasal spine of the palate bone and the aponeurosis of the soft palate, and terminating in the substance of the uvula. The *levator palati* arises from the tip of the petrous bone and the Eustachian cartilage, and descends inwards and slightly forwards to the middle line of the velum, where it blends with fibres of the opposite side. The *tensor palati*, lying anterior and external to the levator, arises mainly from the sphenoid bone, also from the outer surface and lower border of the Eustachian cartilage, and ends in a tendon which winds round the hamular process, and interlacing with that of the opposite side, forms a broad aponeurosis on the under surface of the soft palate. The *palato-glossus* arises from the side of the tongue, and ascends in the anterior pillar of the fauces, to terminate in the submucous tissue on the under surface of the soft palate. The *palato-pharyngeus* arises in the palatine aponeurosis in two layers separated from each other by the *levator palati*, and descends in the posterior pillar of the fauces, to be inserted into the posterior border of the thyroid cartilage and the hinder part of the pharyngeal wall. A fine bundle of muscular fibres which blend below with the *palato-pharyngeus* fibres at their insertion into the pharyngeal wall has a distinct origin above from the lower end of the Eustachian cartilage. These fibres are contained in the lateral fold of the naso-pharynx, known as the *salpingo-pharyngeal* fold, and are sometimes separately designated as the *salpingo-pharyngeus* muscle. The muscles of the soft palate and pharynx have the following actions. By the successive action of the constrictor, the pharynx is narrowed, and the food is propelled downward. The constrictor muscles, moreover,

taking a fixed point behind, act on the parts to which they are attached in front, the superior constrictor rendering the palate tense, the middle raising the hyoid bone and base of the tongue, the inferior drawing the larynx upwards and backwards. The stylo-pharyngeus elevates the larynx and at the same time shortens the pharyngeal cavity. The azygos uvula raises and

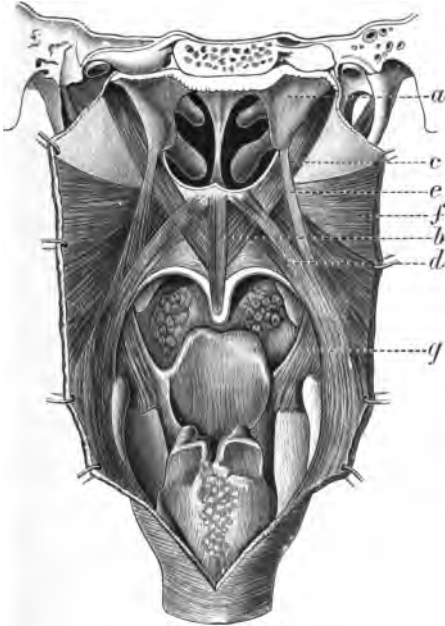


FIG. 9.—Muscles of Soft Palate. (After Sappey.)

a, Eustachian cartilage; *b*, azygos uvulæ; *c*, levator palati; *d*, palato-pharyngeus; *e*, salpingo-pharyngeus; *f*, superior constrictor. The tensor palati muscle is not exposed.

shortens the uvula. The levator palati draws the soft palate upwards, and the tensor palati stretches it, and makes it tense. These latter muscles also open up the lumen of the Eustachian tube. The palato-glossus and the palato-pharyngeus constrict the anterior and posterior arches of the fauces, and, acting with the levator muscles, keep the soft palate horizontal.

The **pharyngeal aponeurosis** is a layer of fibrous tissue between the mucous membrane and the muscles of the pharynx. At the upper part it is dense and firm, but is thinner below. At its upper end, this fibrous wall is attached to the basilar process of the occipital, the apex of the petrous bone, the Eustachian tube, and the internal pterygoid plate of the sphenoid. In the middle line behind a strong band descends from the pharyngeal tubercle of the basilar process, forming the basis of the raphé, into which the constrictor muscles are inserted.

The **tonsils** are two oval masses of lymphoid tissue, situated, one at each side of the fauces, in the recess between the anterior and posterior pillars. They are about the size and shape of an almond fruit, the long axis being vertical, but both size and shape vary much in different individuals. The outer surface of the tonsil is connected with the aponeurosis of the pharynx and the inner surface of the superior constrictor muscle, by which it is separated from the internal carotid artery, and the ascending pharyngeal branch of the external carotid. The internal carotid lies behind the tonsil at a distance of four-fifths of an inch (*Treves*), but if the artery is tortuous it may be close to its hinder and outer surface. A tortuous facial may lie close to the front border of the tonsil. The tonsil corresponds on the surface of the neck to the angle of the lower jaw. The free internal surface presents one or more large slits or several smaller orifices, oval or slit-like, circular or triangular in shape, and of varying size. These orifices lead into recesses, the *lacunæ* or *crypts*, which vary in depth, shape, and direction. Each tonsil may be considered as an association of recesses or diverticula in the mucous membrane. Some of these diverticula are simple recesses, others are pockets of sometimes considerable depth, with smaller recesses leading from them. Some anatomists confine the term *lacuna*, or *crypt*, to these compound pockets, but more usually these terms are applied to all the recesses, whether simple or compound.

If we carefully inspect the tonsil in a young subject, a thin fold of mucous membrane will be seen extending from the edge of the anterior faucial pillar, downwards and backwards, over the surface of the tonsil, the so-called *plica triangularis*. The conspicuousness of this fold varies in different subjects, as do its disposition and extent. It is best seen in hypertrophied tonsils in children, when it often spreads fan-like over the surface of the tonsil, the part so covered being easily recognized by the smooth surface. The upper free edge of the fold is the part most easily made out in many subjects. The fold is often adherent to the tonsil. It is of practical importance in connection with certain affections of the tonsil to refer to the recess situated above the tonsil, between the anterior and posterior pillars, near their junction with each other. This recess has been termed by His the *supra-tonsillar fossa*. It is constant in young subjects, and varies in form and extent, depending on the size and form of the tonsil, and very largely also on the disposition of the *plica triangularis*, as Paterson has especially pointed out. The *supra-tonsillar fossa* extends for a variable distance upwards into the soft palate, and downwards, behind, outside and in front of the tonsil. The opening into the fossa is often more or less hidden by the *plica triangularis*, which must be pulled aside to obtain a complete view. If the *plica* is adherent to the tonsil, a deep diverticulum from the *supra-tonsillar fossa* may be formed, extending downwards between the anterior pillar and the tonsil. Some large crypts open on the upper surface of the tonsil into the *supra-tonsillar fossa*.

The substance of the tonsil is made up of spherical masses of adenoid tissue (lymph follicles) arranged round the walls of the crypts, together with a quantity of diffuse adenoid tissue. On the external or attached surface of the tonsil is a capsule of fibrous tissues from which numerous septa pass into its substance. The free surface of the tonsils, both on the surface and in the interior of the crypts, is covered with a thin mucous

membrane, lined with stratified pavement epithelium continuous with that of the mouth. It has been shown that lymphoid cells are constantly making their way in large numbers, between the cells of the epithelium to the surface of the tonsil, or into the cavities of the crypts. The epithelium presents at many points distinct breaches of continuity, due to the passage of leucocytes, or, at any rate, facilitating their passage. Many mucous glands discharge their secretion into the crypts and on the free surface of the tonsils.

On the base of the tongue, behind the circumvallate papillæ, and above the attachment of the epiglottis, are numerous rounded elevations, due to the presence in the mucosa of masses of lymphoid tissue. This aggregation of masses of lymphoid tissue constitutes the **lingual tonsil**. In the centre of each elevation is a small orifice leading into a central cavity, or crypt, lined with stratified pavement epithelium. Each cavity is surrounded by a layer of adenoid tissue and lymph follicles, and outside this again is a layer of compact connective tissue. At the bottom of each crypt is usually the orifice of the duct of a mucous gland. Leucocytes are here also, as in the faucial tonsils, constantly making their way through the epithelium to the surface. The lingual tonsil is divided at its posterior part into two halves, by the median glosso-epiglottic ligament.

Thus, as has been described, there are four aggregations of lymphoid tissue or tonsils, viz. the pharyngeal tonsil at the vault of the pharynx, the lingual tonsil at the base of the tongue, and the two faucial tonsils, one at each side of the pharynx. These tonsils, which are connected together by a more or less marked lymphoid infiltration, form a ring surrounding the upper orifice of the respiratory and alimentary tract. The pharyngeal and faucial tonsils are usually at their highest development in early childhood, and there is, after puberty as a rule, a retrogression, the pharyngeal tonsil especially tending to atrophy. On the other hand, the lingual tonsil is apt to show its greatest development after puberty.

It must be remembered that the greatest possible variations exist in the development of this lymphoid ring. Sometimes it is well developed at birth, sometimes merely rudimentary. One or other parts of it may be specially well developed. Sometimes the normal retrogression is delayed. Altogether, it is often a matter of great difficulty to draw the line between a physiological and a pathological condition in these structures.

The mucous membrane of the pharynx is, like that of the mouth, invested with stratified pavement epithelium. It also shows papillæ similar to, but smaller than, those of the mouth. Over the posterior aspect of the larynx, the mucous membrane is somewhat loosely connected with the parts beneath, so as to be thrown into folds in various directions.

Many small racemose mucous glands are embedded in the mucous membrane of the pharynx, soft palate, and uvula. They are very numerous on the under surface of the soft palate. These glands can sometimes be discerned with the naked eye, forming little specks or prominences on the surface of the mucous membrane as big as a pin's head or bigger.

The mucosa is everywhere infiltrated with diffuse adenoid tissue and with lymph follicles in considerable numbers. As already stated, the tonsils are composed of a mass of lymph follicles, and diffuse adenoid tissue, and masses of the same tissue are aggregated on the base of the tongue, forming the so-called lingual tonsil. A similar mass has been already described in the vault of the naso-pharynx as the pharyngeal tonsil, and not uncommonly small, flat, rounded, or elongated elevations formed of the same structure are to be seen on the posterior wall of the pharynx. From this adenoid tissue numerous leucocytes migrate through the epithelium on to the free surface.

The arteries of this region are the superior palatine branch of the internal maxillary, supplying the soft palate and tonsil; the ascending palatine branch of the facial, supplying branches to the same parts; the tonsillar branch of the facial,

supplying the tonsil, the side of the pharynx, and the root of the tongue; the ascending pharyngeal artery, supplying the constrictor muscles and the walls of the pharynx; and the superior and inferior thyroid arteries, which give twigs to the lower part of the pharynx. The ascending pharyngeal artery is occasionally abnormally large, and cases have been reported in which it could be seen pulsating at the back of the pharynx on one or both sides. The veins of the pharynx are numerous, and form a plexus beneath the mucous membrane. After penetrating the fibrous and muscular walls, they anastomose around the pharynx and end by various afferent branches in the internal jugular.

The lymphatics of the pharynx form a rich plexus, and pass into the deep cervical glands near the bifurcation of the common carotid. The lymphatics of the soft palate also terminate partly in glands in the vicinity of the muscles attached to the styloid process, and partly in glands a little below the preceding, on the sides of the hyoid bone and larynx. The lymphatics of the tonsil end in the (superior deep) cervical glands, situated near the tip of the great cornu of the hyoid bone. These glands are enlarged in affections of the tonsils, and the swelling is often mistaken for the tonsils themselves. The tonsils, however, even when large, cannot be felt externally.

The sensory nerves are derived from the second division of the fifth, which supplies the upper part of the pharynx, the tonsils, soft palate, and uvula; from the glosso-pharyngeal, which supplies a good part of the pharynx and perhaps, also, the anterior pillar of the fauces and the base of the tongue, although this is doubtful, since these parts are rendered anæsthetic by disease of the root of the fifth nerve; and from the superior laryngeal branch of the vagus, which sends twigs to the laryngeal portion of the pharynx.

The exact source of the motor nerves for the different muscles of the soft palate and pharynx is not yet sufficiently

determined. It is certain that fibres from the "pharyngeal plexus" supply many of the muscles of this region. This plexus is formed by the union of branches of the glosso-pharyngeal and vagus. The three constrictor muscles, the palato-glossus and palato-pharyngus, receive their motor supply from the plexus; and the levator palati, azygos uvulæ, as well as probably the tensor palati, receive their supply from the same source. It is highly probable that the motor supply for the soft palate comes from the spinal accessory, through the branch that the pneumogastric gives to the pharyngeal plexus. It is doubtful whether, as was formerly held, the levator palati and azygos uvulæ receive a supply from the facial, or the tensor palati from the third division of the fifth, through the otic ganglion. The stylo-pharyngeus is supplied by a branch from the glosso-pharyngeal, but some think that the fibres come from the facial, through the connection of the glosso-pharyngeal with this nerve.

II. PHYSIOLOGY.

THE physiology of these regions will be most usefully considered in relation to certain functions with which the nose, naso-pharynx and pharynx are directly or indirectly concerned. These functions are respiration, smell, taste, speech, hearing, and deglutition.

1. **Respiration.**—It is important, in the first place, to remember that the nose, and not the mouth, is the upper part of the respiratory tract. In the normal condition the inspired and expired air passes through the nose; the mouth is called into requisition only occasionally, or in hurried respiration. Habitual mouth-breathing is a diseased condition resulting from some obstruction of the nasal or naso-pharyngeal passages, and it can, perhaps, develop into a habit which persists after the obstruction has disappeared. During inspiration the muscles which act on the *alæ nasi* prevent the *alæ* from being sucked in, and access to the nose is increased by elevation of the *alæ* in forced respiration or in conditions of dyspnoea. These movements of the *alæ nasi* are of reflex origin.

During respiration through the nose, the soft palate and root of the tongue are in contact, thus shutting off the mouth from the pharynx. When the mouth is used for breathing, the root of the tongue sinks, and the soft palate is somewhat raised, so as to leave a passage between them. The deeper the respiration the wider the passage. In deep inspiration the tongue is flattened and the soft palate is raised to the level of the hard palate and the uvula is contracted.

It was formerly held, chiefly from anatomical considerations,

that in quiet respiration the current of air passed through the inferior meatus and the space between the inferior turbinated body and the septum (respiratory tract). The experimental investigations of E. Paulsen on the cadaver, subsequently confirmed by those of R. Kayser on the living subject, and by experiments of G. Franke, show that this is not the case. During inspiration, in the normal nose, the current of air ascends towards the roof of the fossa, and passes backwards in a curve in the region of the superior and middle turbinated bodies, describing a curve (almost a semicircle) in its course. Reaching the naso-pharynx, the current impinges against the upper part of the posterior wall as it descends towards the lower air-passages. The inferior turbinated body is altogether out of the stream of incoming air, which only impinges on its posterior portion as it curves downwards. In expiration, the current follows the same course in the reverse direction. The division of the nasal fossa into a respiratory and olfactory region is, therefore, from a physiological standpoint, inexact. The so-called olfactory region is part of the respiratory tract. Indeed, it is by reason of the current of air passing over the region in which the olfactory nerve is distributed that the nose is able to fulfil its olfactory function.

The nose performs three functions in connection with respiration. It purifies the inspired air, it moistens it, and alters its temperature. Particles of dust are intercepted to some extent by the vibrissæ at the orifice of the nose, and are partly retained by the mucous membrane in the nasal passages. The somewhat tortuous course which the inspired air follows, broken in upon, as it is, by the projecting turbinals, is calculated to favour the arrest of dust particles. Such dust particles as pass the nose are arrested on the posterior wall of the naso-pharynx, and, under ordinary circumstances, little or none reaches the lower air passages. The nasal mucus covering the surface of the mucous membrane, retains the dust particles. In this mucus the cilia are constantly at work, aiding in the

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removal of the particles from the nasal passages. Micro-organisms of various kinds existing in the air are also arrested at the orifices or retained by the surface of the mucous membrane. The nasal mucus has been credited by some experimenters with considerable bactericidal power. If this be so, the nose serves not only to arrest a number of pathogenic micro-organisms, but also exerts a destructive action on their vitality. Drs. St. Clair Thomson and Hewlett made some observations tending to prove that micro-organisms are only exceptionally present in the nasal fossæ proper, as distinguished from the vestibules, where they are abundant. In more than 80 per cent. of their observations the nasal mucus was found to be absolutely sterile. Other observers, however, have found micro-organisms (especially staphylococcus aureus and streptococcus) constantly present in the mucus of the nasal fossæ.

By virtue of its moisture, the mucous membrane of the nose imparts to air, inspired through it, a considerable amount of water. In fact, the air is completely saturated in its passage through the nose, and it has been computed that water to the amount of some 7700 grains is daily abstracted from the nasal mucous membrane in this manner (*Aschenbrandt, Kayser*). This amount agrees with that which physiologists formerly supposed to be abstracted from the lungs in twenty-four hours. This moisture is derived from the secretion of the numerous serous glands with which the mucous membrane is studded.

Besides being more or less completely saturated with moisture, the air, in its passage through the nose, is brought more nearly to the temperature of the body. *Aschenbrandt* and *Kayser* have both shown by independent experiments that, with the external temperature at from 46° F. to 53° F., the temperature of the air after it has passed through the nose is raised to 86° F. When the external air is at 32° F. it is raised to 81° F., and when at 66° F. to 90° F. (*Kayser*). *Kayser* also performed a series of experiments to find out how much the air was warmed and moistened in oral breathing. He found that

air was heated only half a degree less in passing through the mouth than in passing through both nostrils, and further, that it is saturated with moisture in its passage through the mouth. These experiments, however, only deal with short periods of time. For longer periods the difference would doubtless be marked. The dryness of the mouth and throat, which is experienced from prolonged mouth-breathing, is evidence of the comparative unsuitability of the mucous membrane for yielding moisture, as compared with the nasal mucous membrane. The nose, by reason of the extensive surface afforded by the turbinals, its richness in blood-vessels, and the abundance of its secretion, is well adapted for the necessary warming and moistening function.

The patency of the nasal passages is subject to alteration by temporary erection of the inferior turbinated body, especially of its anterior end. The conditions under which this occurs are not thoroughly understood, and it is difficult to exactly draw the line between physiological and pathological swelling of that body. Direct irritants will cause it to swell, and so will inhalation of very cold or overheated air. Erection of the anterior end of the inferior turbinated body has been noticed by Hack and others to occur, in a reflex manner, by the action of a strong light, and through the application of cold to the skin. These bodies have been sometimes observed to swell in women at the menstrual periods. Sudden swelling and sudden collapse of the bodies have both been observed to occur under the influence of mental impressions, fright, etc.

2. **Smell.**—As already stated, the mucous membrane on the upper turbinated body, and on the opposed part of the septum, is supplied with nerves from the olfactory bulbs, and constitutes the organ of smell. Odorous emanations are conducted to this region by the inspired current of air, and the air must be in motion, in order that odours may be perceived. The first moment of contact is the most acute. By sniffing up the air, and so carrying up a greater quantity of air and

odorous material into the nose, we can increase our perception of smell.

Integrity of the olfactory epithelium, nerves, and centres, is of course essential to the function of smell. Moisture of the mucous membrane is also necessary for the perception of smell. Everything interfering with the free movement of air, through the olfactory region, or with the healthy condition of its mucous membrane, will interfere with the sense of smell. It must be remembered that certain pungent substances, such as ammonia, snuff, and the like, exert a stimulating action on the fifth nerve, which is independent of true olfactory sensation. Althaus states that electrical stimulation of the olfactory membrane gives rise to a sensation of a smell of phosphorus.

3. **Taste.**—A good deal of what we call taste is really smell. The nerves of taste derived from the glosso-pharyngeal and fifth, supplying the tongue and fauces, enable us to perceive the four varieties of taste, viz. sweet, bitter, acid, and salt. The various flavours which we associate with the sense of taste are really due to odorous emanations, carried up through the naso-pharynx to the posterior nares, especially in the expiration, which occurs immediately after swallowing. Loss of smell, therefore, interferes with the power of distinguishing these flavours.

4. **Speech.**—The voice is produced by the vibration of the true vocal cords, and the sound waves so provided are modified in various ways by the movements of the soft palate, tongue, cheeks, and lips, and likewise by the form of the cavities of the pharynx, mouth, and nose.

The nasal cavities and naso-pharynx exercise an important influence on voice and speech. These cavities may be said to act as reverberating chambers, the air within them being thrown into vibration by the voice sounds. In the production of all the consonants except *m*, *n*, and *ng*, the soft palate is raised so as to close the passage from the mouth and pharynx to the

nose. This closure is aided by the formation of a transverse ridge in the posterior wall of the pharynx opposite to the palate, due to contraction of the superior constrictor. In pronouncing the consonants *m, n, ng*, the air is allowed to escape through the nose. In pronouncing the pure vowel sounds, the palate is also raised, but to a different extent in the different vowels. It is most raised in the *ee* sound, and in a gradually diminishing extent in the other sounds in the following order: *oo, o, a, ah*. The naso-pharynx is firmly closed in the *ee* sound and gradually less so in the others, but no air escapes through the nose in any. When, however, the vowel sounds are pronounced with a nasal tone the soft palate is not raised, and air escapes through the nose. When through perforation or paralysis, the soft palate is unable to shut off the nose from the mouth, articulation of most consonants becomes imperfect, and the vowel sounds are spoken with a nasal timbre, owing to the nasal cavity not being cut off, and the air therein being thrown into sympathetic vibration.

In order to exert their proper effect on the voice, the nasal cavities should have free communication with the outer air in front. If there is obstruction of the anterior nares only, it gives the voice a peculiar nasal character, owing to altered nasal resonance. This is especially marked in the sounds of *m* and *n*, which acquire the character known as "speaking through the nose." If, however, the nasal passages or naso-pharynx are so encroached upon by swelling of the mucous membrane, new growths, or any other cause, that these cavities can no longer act as a reverberating chamber, the quality of the voice is *deadened* in all its tones, the nasal sounds cannot be properly produced, and the nasal consonants, *m* and *n*, tend to become respectively *b* and *d*.

5. **Hearing.**—Through the Eustachian tube the mucous membrane of the naso-pharynx is continuous with that of the tympanic cavity. The tube is usually closed, but it is opened at the moment of swallowing by the contraction of the fibres

of the tensor palati muscle, and probably also, in a much less degree, by the levator palati, and salpingo-pharyngeus. This is also effected to a less extent by the movements of the palatal muscles in phonation. The air in the tympanic cavity is thus maintained at the same tension as the outer air. Any nasal, or naso-pharyngeal trouble, which directly or indirectly affects the Eustachian tube, is liable to lead to ear troubles. Thus inflammatory conditions may extend from the naso-pharynx into the Eustachian tube, and thence to the tympanum. Growths in the naso-pharynx may directly occlude the Eustachian orifices, or may interfere with the movements of the palate muscles. Complete nasal obstruction is attended with ill-effects because, at each act of deglutition, air is exhausted from the tympanum, and the tympanic membrane is thereby drawn in.

6. *Deglutition.*—When, by certain voluntary movements of the jaw-muscles and tongue, the bolus arrives at the isthmus of the fauces, an involuntary or reflex movement commences, whereby it is propelled through the pharynx into the oesophagus. The muscular movements by which this latter is effected are the following:—The tongue is carried backwards and upwards by the contraction of the stylo-glossi and the intrinsic muscles, and the palato-glossi muscles contracting cause the anterior pillars of the fauces to come together, like two side curtains, which, meeting the raised dorsum of the tongue, prevent the return of the bolus to the mouth. A series of simultaneous movements are meanwhile occurring with the object of propelling the morsel onward, and of closing the naso-pharynx and upper orifice of larynx. The pharynx is drawn upward and somewhat forward by the action of the palato-pharyngei and stylo-pharyngei, and of the constrictors and muscles passing from the lower jaw (which is fixed by the muscles of mastication) to the hyoid bone. The ascent of the pharynx is accompanied by a similar ascent of the larynx, to be presently described, as may be felt by putting the tip of the

finger on the larynx during the act of swallowing. The successive action of the constrictors, from above downwards, propels the bolus to the œsophagus. The closure of the naso-pharynx is effected by the combined action of the superior constrictor and the muscles acting on the soft palate. The soft palate is raised and made tense by the levator and tensor muscles. The contraction of the fibres of the palato-pharyngei and salpingo-pharyngei approximate the posterior pillars and the lateral folds of the pharynx, and the upper constrictor presses the posterior and lateral walls of the pharynx against the horizontally-stretched soft palate. The closure of the larynx is effected in the following manner:—The hyoid bone is drawn forwards and upwards by the genio-hyoid, the mylo-hyoid, and anterior belly of the digastric, and the thyroid cartilage is drawn up behind the hyoid bone by the thyro-hyoid muscle. In this way the larynx comes to lie under the root of the tongue, which presses the epiglottis downwards over the entrance of the larynx like a lid, the depression being aided by the contraction of the aryteno-epiglottideus muscle. The simultaneous closure of the glottis by the constrictor muscles (arytenoid, thyro-arytenoid, lateral crico-arytenoid) also prevents the entrance of substances into the larynx. Indeed, it has been proved, from cases in which the epiglottis was entirely destroyed by disuse, that the food is still prevented from entering the larynx by the contraction of these constrictor muscles.

According to Falk and Kronecker, the energetic action of the muscles which contract the cavity of the mouth propels the bolus rapidly through the pharynx and œsophagus, and the bolus actually reaches the stomach before the successive muscular contractions (peristaltic) of the walls of these cavities take place. Thus the middle and lower constrictors take little or no part in driving the food onward, especially in the case of fluids and small morsels, though these muscles as well as the œsophagus contract from above downwards after

the food has passed them. These contractions would, therefore; be for the purpose of sweeping into the stomach any fragments that have been left behind.

The first stage of deglutition, the thrusting of the food through the isthmus funcium, is a voluntary act. The remainder of the process is reflex. The afferent impulses of this reflex act are conveyed by the glosso-pharyngeal, by branches of the fifth, and by the pharyngeal branches of the superior laryngeal nerve. The efferent impulses descend the hypoglossal, the glosso-pharyngeal, the fifth, the vagus, and the spinal accessory nerves. The centre of the reflex act lies in the medulla oblongata, above that of respiration.

Function of Tonsils.—The function fulfilled by the tonsils, whether faucial, pharyngeal, or lingual, has been a matter of much discussion. Many different theories, some of them extremely fanciful, have at various times been enunciated on the subject. We have already seen that the tonsils consist of a collection of lymph nodules, separated from each other by diffuse lymphoid tissue, arranged around depressions or ingrowths of the epithelial covering. There is no reason to suppose that the tonsils are in any way concerned in the absorption of nutriment. They produce, strictly speaking, no secretion, such mucus as is discharged from them proceeding from the numerous mucous glands in the mucous membrane. There is fairly good reason for believing that these structures are connected with the blood-forming function, and that leucocytes are formed in them. It is certain that they constantly discharge a large number of leucocytes from the interior to the free surface, and these leucocytes (phagocytes) appear to take up foreign bodies, and especially micro-organisms. Many authorities therefore incline to the view that the principal function of these structures is connected with the destruction of pathogenic micro-organisms, and that the pharyngeal, faucial, and lingual tonsils thus form protective zones between the nose and mouth, and the rest of the alimentary and respiratory

tracts. Under circumstances which interfere with the free outward stream of leucocytes from the tonsils, it is thought that pathogenic organisms may enter the tonsils by the spaces between the epithelial cells through which the leucocytes ordinarily wander outwards.

The physiological bearing of the accessory sinuses is probably not fully known. The speculations of Braune and Clasen, of Paulsen, Kessel, and others, on the subject, are of doubtful import. It is obvious enough, however, that their presence in the bones affords a greater superficial area for the construction of the brain case and the face, combined with a given weight, than if the bones were solid; although it must be admitted that the difference, as compared with the total weight of the head, is very insignificant. It is probable that these cavities also act as resonating chambers for the voice sounds.

III. GENERAL DIAGNOSIS.

1. SYMPTOMATOLOGY.

External Appearance.—The appearance of the external nose will sometimes give indications of disease of the internal parts. It is rare for internal growths or swellings to cause deformity. Occasionally, however, the alæ may be bulged out by such conditions, or a swelling may protrude from the external orifice. A commoner appearance is a collapsed, pinched condition of the alæ, characteristic of long-continued mouth-breathing. The aspect of the face generally may be characteristic of habitual mouth-breathing. Deviation of the tip, or of the dorsum of the nose, or asymmetry of the orifices may indicate deflections of the septum. Falling in of the external nose, at the bridge, or below, may be present from injury or disease of the bony or cartilaginous framework of the nose. Redness of the tip and alæ of the nose is sometimes associated with congestion or hypertrophic conditions in the passages. Redness, excoriations, cracks, and fissures, about the nasal orifices and upper lip, are often dependent upon nasal discharge. Thickening of the upper lip, and of the tip and alæ of the nose, may result from inflammatory conditions in the vestibule and about the nasal orifices.

Asymmetry and swelling of the external parts may be present in throat disease, and may occasionally furnish important indications. Swelling of the lymphatic glands near the bifurcation of the carotid on one or both sides is a common sign, and sometimes one of considerable import.

Nasal Discharge and Expectoration.—The mucous membrane of the nose secretes, daily, a large amount of thin, clear fluid, which keeps the surface moist, and gives up moisture to the inspired air as it passes through the nose. Under normal circumstances, none of this is discharged from the nose. However, under the prevalent influences of climate and atmospheric impurities, some discharge is so common that we may regard the removal of a variable amount of mucus by blowing the nose as falling within normal limits. This may be increased in diseased conditions to the extent of using one or more pocket-handkerchiefs daily, or to such an extent as to run in an almost constant stream from the nose. The morbid discharge may be constant or intermittent. It may have a serous, mucous, muco-purulent, or purulent character. It may be very thick, and crusts of more or less hardness may be discharged. The discharged matter or crusts may have an offensive odour. It must be remembered that the source of nasal discharge may not be the nasal passage itself, but one or more of the accessory sinuses. Secretions may be removed from the nasal passages through the posterior nares, as well as through the anterior nares, and in some cases of nasal obstruction they may be discharged wholly in the former direction. It is always important to inquire if a discharge is from one or both sides of the nose. A one-sided discharge of pus is suggestive of disease of the accessory sinuses, or, in the case of a child, of a foreign body.

Expectoration is a common symptom of nasal and pharyngeal affections, and the sputum may be mucous, muco-purulent, or purulent in character. Secretions in the naso-pharynx, whether formed there or discharged from the posterior nares, are removed by noisy inspiratory and hawking efforts. Dry crusts forming in this region are always difficult to remove, and the efforts to do so may lead to retching or vomiting. Diminished secretion, leading to dryness of the nasal or pharyngeal mucous membrane, is much less common than the opposite condition.

Hæmorrhage.—Bleeding from the nose is a common symptom. It may be symptomatic of some lesion in the nose, or of some general blood state predisposing to hæmorrhage. The quantity of blood varies from a mere tinge in the secretion to an amount which threatens the life of the patient. The blood is usually discharged by the anterior nares, but it may pass back into the naso-pharynx. Blood from the naso-pharynx or pharynx may be spat out or swallowed. In the latter case it may be subsequently vomited. Blood from the naso-pharynx may be partly discharged anteriorly through the nasal passages.

Offensive Smell from the Breath.—An offensive odour from the breath is a common symptom of nasal and pharyngeal affections. The character of the breath should be examined as the patient exhales through the mouth only, and through the nose only. By this means it will be possible to determine if the smell proceeds from the nasal or naso-pharyngeal passage, or from elsewhere. The nose is the most frequent source of offensive breath. The term *ozæna* was formerly used to designate diseases of the nose characterized by an offensive odour, but at the present day is reserved for the disease known as chronic atrophic, or fetid rhinitis (p. 134). The most frequent causes of offensive odour from the nose, besides chronic fetid rhinitis, are syphilitic, tuberculous, and malignant ulceration, the retention of sequestra, foreign bodies, and rhinoliths, and suppuration of the accessory cavities. In most cases the patient is conscious of some odour or unpleasant taste, but in genuine *ozæna* the sense of smell is usually lost, and the patient has no perception of the offensive odour. The faucial tonsils are not unfrequently the origin of an offensive breath. It is commonly present in cases of retention of caseous masses in the tonsillar crypts.

Interference with Respiration.—Under normal conditions respiration is carried on through the nose. Impeded nasal respiration is a common result of various affections of the

nasal passages and naso-pharynx, and occasionally of the buccal pharynx. It is often of the utmost importance to discover how far nasal respiration is impeded. The patency of the passages should be tested by successively closing each passage, and directing the patient to breathe through the other. The sound of the air, as it passes to and fro, will give a fair estimate of the condition. We should try also if the patient can breathe with the mouth shut for any length of time. It is also of the greatest importance to ascertain if the patient habitually breathes through the nose, both when awake and asleep. Many persons, with a certain degree of obstruction, can breathe through the nose when their attention is called to it, but yet do not habitually do so. The facial aspect of chronic mouth-breathing, if present, should be noted, and inquiry should be made as to whether the patient snores during sleep. The symptoms of nasal obstruction will be dealt with more fully in a special section (see Nasal Obstruction). Apart from impediments to nasal respiration, various conditions which narrow the calibre of the pharynx may more or less seriously interfere with respiration.

Impairment of the Senses of Smell and Taste.— This is a symptom often complained of in nasal disease. If it be desired to test the olfactory sense, pungent substances, such as ammonia, which excite the fifth nerve, must not be employed. Some essential oil, such as cloves, or peppermint, or substances like musk or camphor, must be used. Zwaardemaker, of Utrecht, has constructed a simple and ingenious instrument which he terms an *olfactometer*, for testing the acuteness, or the degree of loss of the sense of smell. The instrument (Fig. 10) consists of a cylinder composed of some odorous substance, such as caoutchouc, or of a porous porcelain cylinder impregnated with some odorous liquid, into which a graduated glass tube is fitted, which can be inserted or withdrawn as may be wished. The whole is enclosed in an outer glass cylinder. The graduated glass tube passes through a

wooden screen, and is bent up at the end to fit the nostril. The instrument is supported by a handle attached to the same. When the glass tube is inserted in the cylinder to the full extent, so that the ends of the tube are in apposition, the air drawn through is free from odour, and according as the glass tube is drawn out, the air passes over a larger surface of the odorous substance, and the intensity of the odour increases. The moment the odour is perceived the graduated scale is read off. Any diminution in the acuteness of smell can then be estimated by the number of centimeters on the scale to which the tube has to be withdrawn, beyond the normal, before an odour is perceived.

Interference with Voice and Speech.—Speech may be affected in various ways. What is commonly called a

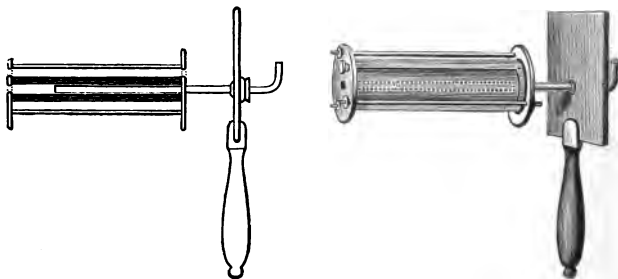


FIG. 10.—Zwaardemaker's Olfactometer.

“nasal voice” includes two different characters of voice depending on opposite physical conditions. In the one, the so-called *rhinophonia clausa*, the current of air through the nose is impeded, and the resonance of the voice is diminished or lost. The most familiar example of this is when the nasopharynx is blocked with adenoid growths. There is inability to sound the nasal consonants *m*, *n*, and *ng*, and the voice acquires a flat, toneless, dead character. If the obstruction is situated at the choanæ the same defects are present, though in

a slightly less marked degree. According as the obstruction is situated more forward, the impairment of resonance is less marked, but it acquires an altered character.

The other kind of nasal voice, the so-called *rhinophonia aperta*, is that in which the soft palate is unable to shut off the nasal cavities. The voice acquires a nasal twang, and the articulation of the consonants (except the nasal consonants) is imperfect. This is observed in clefts, perforations, and paralysis of the soft palate. Affections of the buccal pharynx, which encroach on the space, such as enlarged tonsils, inflammatory swellings, tumours, etc., deaden the voice more or less, and in certain cases may render the speech thick, indistinct, and, indeed, unintelligible.

Interference with Deglutition is present in various affections of the throat. Deglutition may be affected in different ways. Thus it may be painful, and this may be the sole difficulty; or there may be some actual mechanical impediment, owing to reduction in the calibre of the canal, requiring additional effort. It may result from some spasmodic or paralytic condition of the muscular structures. In paralysis of the soft palate fluids regurgitate through the nose. Sometimes the difficulty consists in the entry of fluids or solids, especially the former, into the nose or larynx, in consequence of paralysis or destruction of the parts concerned in shutting off these passages during deglutition.

Ear Troubles.—Deafness, noises in the ears, ear-ache, and otorrhœa often arises in connection with nose and throat troubles. In some cases, the trouble arises from extension of inflammation through the Eustachian tube to the middle ear. Various pathogenic germs may reach the middle ear through this path. Interference with the ventilating function of the Eustachian tube is often the cause of ear trouble. This may result from pressure of growths on the orifice, from inflammatory thickening, or secretion in the tube, or from interference with the proper action of the levator palati and tensor tympani

muscles. In consequence of the non-ventilation of the tympanum, rarefaction of the air in the middle ear occurs, and in-drawing of the membrana tympani results. Moreover, owing to the diminished air pressure, hyperæmia and effusion of fluid within the tympanic cavity may take place.

Eye Troubles.—Conjunctival inflammations sometimes result from extension from the nose, through the lachrymal duct. Suppuration of the lachrymal duct itself usually arises from nasal disease. The orbit is sometimes encroached upon, and the eyeball displaced by diseases which cause distension of the accessory sinuses. The optic nerve is liable to pressure and consequent atrophy from disease of the sphenoidal sinuses.

Subjective Symptoms.—Pain in the head is a very frequent symptom of a variety of nasal diseases. The pain may be constant, or paroxysmal, unilateral, or on both sides; it may be frontal, vertical, or occipital, or in the nape of the neck. Periodic pains are rather suggestive of disease of the accessory cavities. Apart from headache, a certain amount of dulness of the intellect, inability to concentrate the attention, and defective memory have been frequently observed in connection with obstructive diseases of the nose and naso-pharynx. Guye, of Amsterdam, invented the name *aprosexia* for this mental condition, and attributed it chiefly to a stasis in the passage of lymph from the interior of the cranium to the nose, through the lymph channels connecting these regions (see page 13). It seems more probable, however, that the condition, when it does exist, is to be attributed to the effects of impeded respiration through the nose, such as headache, deafness, impaired nutrition, imperfect oxygenation of blood during sleep, disturbed rest at night, etc.

Various subjective sensations, such as a feeling of burning, tickling, dryness, or a feeling of a foreign body in the throat, are often complained of, and in many cases the objective appearances by no means account for these symptoms.

Reflex Symptoms.—Sneezing is a familiar symptom of

nasal irritation. The afferent nerves are the branches of the fifth nerve distributed in the nasal mucous membrane. The sneezing which occurs in many people on going into bright sunshine, is excited through nerves derived from the nasal branch of the ophthalmic division of the fifth (long ciliary nerves). Neither the olfactory nor optic nerves are concerned in sneezing.

Cough is not unfrequently the result of pharyngeal irritation, and sometimes of naso-pharyngeal and nasal troubles. A cough of this kind is often spoken of as a "reflex cough." Cough, unless when voluntarily produced, is, of course, always a reflex act, the usual seats of irritation being the larynx and lower air passages. In a so-called reflex cough the seat of irritation is outside the usual area.

Asthmatic symptoms are sometimes reflexly excited by nasal irritation. Experiments on animals (*François-Franck, Lazarus*) have demonstrated that spasm of the bronchial muscles can be set up by nasal irritation.

Certain vaso-motor and secretory phenomena in the nose are reflexly excited by various irritants acting on the nasal mucous membrane. The most important effect of vaso-motor disturbance is the swelling which takes place in the inferior turbinated body from distension of the venous plexus (erectile tissue) in this region. Various other reflexes, affecting more or less distant parts, have been attributed to nasal irritation. They are mostly associated with vaso-motor and secretory disturbances in the nose itself. The subject will be dealt with in a separate section (see Reflex Nasal Neuroses).

2. ANTERIOR RHINOSCOPY.

In order to examine the nasal passages from the front the patient should be seated upright facing the observer. A bright, steady light should be placed at the side of the patient's head, preferably on his right side. A duplex lamp

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gives a fair illumination, but the light most commonly employed, which serves the purpose very well, is that from an argand gas-burner fitted with a metal chimney and a bull's-eye condenser. Gaslight can be very materially improved by adopting the incandescent burner. The electric light, when attainable, is superior to gaslight. A 32-candle-power electric lamp, surrounded by a metal casing, and furnished with a bull's-eye condenser, gives an excellent light. The oxy-hydrogen limelight is also undoubtedly one of the brightest and best artificial lights that can be used. Sunlight is, however, superior to any artificial light, but is not sufficiently at our disposal to be generally employed.

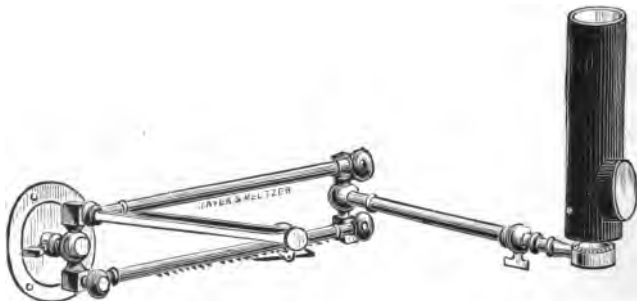


FIG. 11.—Mackenzie's Bracket.

For consulting-room use the lamp should be capable of being raised and lowered on the reading-lamp principle, or should be fitted on a Mackenzie's bracket with perpendicular and horizontal movement (Fig. 11).

The observer, sitting in front of the patient, wears a reflector, by means of which the light from the lamp is thrown on to the patient's face. This reflector is slightly concave, with a radius of curvature of about 12 inches (equivalent to a focal distance of 6 inches). It is most conveniently worn fitted upon a spectacle frame (Fig. 12). The centre is perforated with a hole which is placed over either eye, and

through which the observer looks. It is usually best to wear the reflector over the left eye, the lamp being on the patient's right side; but if one eye is better than the other, the reflector will, of course, be worn over the better eye. The lamp should, however, if possible, be on the same side as the reflector, as the smaller the angle at which the light falls on the reflector, the less light is lost. The exact distance the

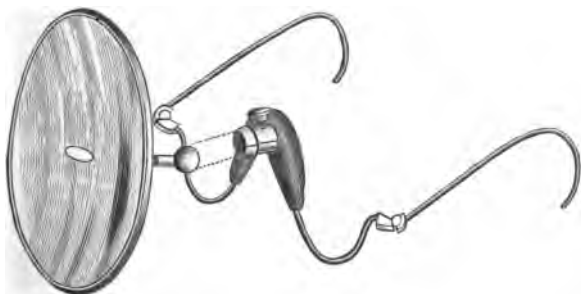


FIG. 12.—Reflector, with Spectacle Frame.

lamp should be placed from the reflecting mirror in order to obtain the best illumination depends, of course, upon the focal length of the mirror. The distance between the mirror and the patient's face should be about 10 inches. If a mirror of 6 inches focal length be employed, the lamp should be about 15 inches off; if a mirror of a longer focal length be employed, the lamp must be placed still further away.*

Having concentrated a bright circle of light on to the

* A concave spherical mirror projects from a luminous object, which lies on the far side of the centre of curvature, an inverted, diminished, and therefore more luminous, real image, between the centre of curvature and the principal focus. The relation is expressed in the formula—

$$\frac{1}{p} + \frac{1}{p'} = \frac{2}{R}$$

where p is the distance between the object (in this case the lamp) and the mirror, p' the distance between the image and the mirror, and R the radius of curvature.

patient's nose, we can obtain a view of the interior of the vestibule by getting the patient to tilt the head slightly back, and raising the tip of the nose with the thumb. To examine the nasal cavities thoroughly from the front, one or other of the various nasal specula must be used to dilate the anterior naris. It is unnecessary to describe all the different kinds of specula that have been invented. Duplay's speculum (Fig. 13) is that which I believe to be most generally useful. It is made of polished metal, and is of bivalve form. When closed it forms a hollow cone, flattened from side to side, and, by means of a screw, one blade is separated from its fellow at the distal end. The

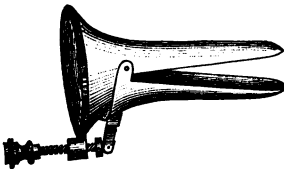


FIG. 13.—Duplay's Nasal Speculum.

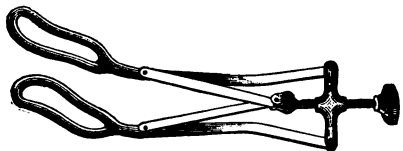


FIG. 14.—Fränkel's Nasal Speculum.

movable blade is best inserted next to the ala. Fränkel's speculum (Fig. 14) consists of two fenestrated blades, made of stout wire, which are gradually separated by working a screw at the end. Both blades may be inserted into one nostril, or one blade may be inserted into each nostril, and both nostrils dilated at once. Most operators use it in the former manner. Thudichum's speculum (Fig. 15) consists of two flattened blades, united by a bridge of flexible wire. The spring is too strong in most of those sold. If well borne, Thudichum's speculum is a very convenient one, and is self-retaining. Lennox Browne has modified this speculum. He has the blades the same shape as Thudichum's, but made of ivory, and the connecting bridge is shortened or lengthened by a telescopic arrangement instead of a wire spring (Fig. 16).

Cresswell Baber has devised a self-retaining nasal speculum that is often useful for operative purposes. It is formed of two wire hooks united by an elastic band with a buckle. The hooks are inserted at each side of the nostril, and the band is



FIG. 15.—Thudichum's Nasal Speculum.

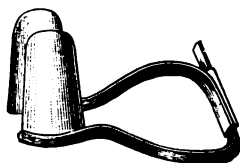


FIG. 16.—Lennox Browne's Nasal Speculum.

passed round the patient's head. By tightening or loosening the buckle the amount of dilatation can be regulated.

Whatever speculum is used, it should be inserted gently, and the blades separated slowly, the patient's head being tilted slightly backwards while this is being done. The distance the speculum should be introduced, to afford a good view, varies in different cases, but it should not be far enough in to press on the anterior part of the inferior turbinated body. If a good beam of light is, meanwhile, thrown from the reflector into the dilated nasal aperture, a view of the interior of the nasal cavity is obtained. The anterior end of the inferior turbinated body will be seen forming a rounded prominence on the outer wall. The patient's head should now be tilted forwards, and the inferior turbinated body, the inferior meatus, and the floor of the nose examined as far as possible. Next the patient's head should be tilted backwards, when the middle turbinated body will be seen, above and behind the inferior, and the upper part of the nasal cavity can be explored. By turning the patient's face a little to one side or the other, a more or less complete view can be obtained of the septum, or of the parts on the outer wall. It is a good plan to hold the speculum with the left hand, and to guide the movements of the patient's head with the right.

Anterior Rhinoscopic View.—The actual extent of the structures seen varies in different cases. Unusually long and coarse vibrissæ at the anterior nares may constitute an impediment, and may require to be cut close with scissors before proceeding with the examination. Deformities of the septum may restrict the view to almost any extent. Swelling of the anterior end of the inferior turbinated body may also much impede the view. Further, as Cresswell Baber* points out, the amount of the middle turbinated body that will be seen in any given case depends greatly on the development of the thickening of the mucous membrane of the septum, known as the tubercle of the septum. When there is no unusual interference with the view the following parts will be seen:—

The convex surface and lower border of the inferior turbinated body can be traced backwards for a considerable distance, or even for the whole length, presenting a somewhat undulating character. The inferior meatus can be illuminated for a variable distance back, and if the head be well tilted forwards, the floor of the nasal cavity can often be traced to the posterior extremity. Its surface is usually uneven, especially in front. The mucous membrane on the inferior turbinated body has a somewhat velvety appearance, and a decided red colour,† especially at the anterior part. The floor of the nose has usually a duller red tint than the inferior turbinated body.

If a strong light be thrown along the floor of the nose, and into the space between the inferior turbinated body and the septum, the posterior wall of the pharynx will often be discerned. On directing the patient to swallow, the movement upwards of the levator cushion, and inwards of the salpingo-pharyngeal fold, can be perceived. In a tolerably capacious nasal cavity this is not difficult, especially after the application

* "A Guide to the Examination of the Nose." London, 1886.

† With sunlight all the parts have a paler appearance than with gaslight.

of cocaine to the inferior turbinal. The middle turbinated body will be seen above the inferior, situated further back, and nearer to the septum. The pale, shining appearance of this body will contrast with the inferior. The anterior vertical border, which varies much in thickness, and the angle between this and the inferior border, are the parts most plainly seen. If both the inner and the outer margin of the anterior border are seen, one often gets the impression of a body descending from the roof, instead of one curving downwards from the outer wall of the fossa. The anterior border will not, however, always be seen in its whole thickness. If the thickening on the septum, previously referred to as the tubercle, be well marked, the inner margin of this border will be hidden from view, and it will then often seem to touch the septum, although such may not really be the case. If, however, the tubercle be slightly marked, or absent, the whole thickness of the anterior border, and part of the inner surface of the middle turbinated body, will be visible. Between its inner surface and the septum is the narrow space known as the olfactory slit, the upper part of which can rarely be illuminated. Running back from the angle is the inferior border of the body, which, with the middle meatus, can be illuminated for a variable distance. Variations in the form of the middle turbinated body are very often seen. Thus the inner surface facing the septum, instead of presenting a convex form, may be concave, thus widening the olfactory slit. The anterior extremity of the bone may form a large inflated protuberance, which may be in contact with both the septum and external wall.

With the patient's head well thrown back, the fore part of the roof will be brought into view, but the superior turbinated body and superior meatus cannot be seen by anterior rhinoscopy.

A swollen condition of the erectile tissue on the anterior part of the inferior turbinated body is a common interference

with the view in anterior rhinoscopy. This body then presents a smooth, rounded prominence, which may touch the septum and completely obstruct the view of the nasal fossa. This swelling has sometimes a very pale colour. With pressure from a probe, it indents readily, the indentation immediately disappearing on removal of the pressure. In cocaine, however, we have an effective means of reducing turgescence of the inferior turbinal. The application to the mucous membrane of a five or ten per cent. solution of hydrochlorate of cocaine quickly reduces erectile swelling of the turbinal. It, moreover, causes ischæmia and a certain amount of contraction of the mucous membrane generally, and reduces inflammatory turgidity when present. Cocaine is indeed an indispensable adjunct to anterior rhinoscopy, and with its aid we can obtain a view of the interior of the nasal passages, and their recesses, such as was impossible before its introduction.

3. POSTERIOR RHINOSCOPY.

The patient is seated as for anterior rhinoscopy. The illumination is obtained in the same manner, a strong circle of light being concentrated on the palate and back of the pharynx. A preliminary inspection of the fauces should always be made, with or without the use of a tongue depressor. While doing this the condition of the soft palate, whether hanging down, well away from the posterior wall of the pharynx, or not, will be noticed, and will afford some idea whether a rhinoscopic examination can be made with ease or difficulty.

In order to examine the naso-pharynx a small mirror is used. Various forms of rhinoscopic mirrors have been invented. One, which is sometimes used, exactly resembles a small laryngeal mirror. The shaft, however, should be attached to the mirror at more nearly a right angle, although, for examining the posterior wall and vault, the ordinary angle of the laryngeal mirror is more convenient. The mirror should

be about half or five-eighths of an inch in diameter, but it is useful to have two sizes. It is convenient to have the shaft slightly bent, so as to follow the curve of the tongue. A rhinoscopic mirror such as Michel's (Fig. 17), is, I think, unquestionably more convenient, and is now generally employed.

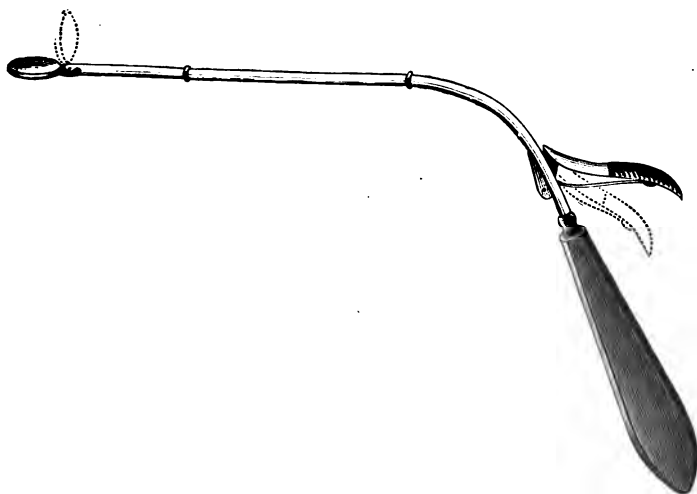


FIG. 17.—Rhinoscopic Mirror.

In this instrument the mirror is in the same horizontal plane as the shaft, and can be raised to any angle by pressing a spring in the handle.

In order to use the rhinoscopic mirror satisfactorily, it will generally be necessary to employ some means for keeping the tongue down. A depressor which has the handle at right angles to the blade should be used. There are many such depressors in use. Türck's tongue depressor (Fig. 18) is often recommended, but I think for this and most other purposes Fränkel's (Fig. 19) is the best. It is important to press the base of the tongue steadily downwards and forwards. This is not always an easy matter, but much depends upon this being

well done. Less often a rhinoscopic examination can be made without a depressor, the shank of the mirror serving the purpose.

The patient sits erect, with the head inclined very slightly forwards, and the mouth open, and is directed to breathe quietly and naturally. The light is concentrated on the palate and pharynx, and the rhinoscopic mirror, previously warmed, is introduced *rapidly* from the corner of the mouth with its reflecting surface upwards, to one or other side of the uvula

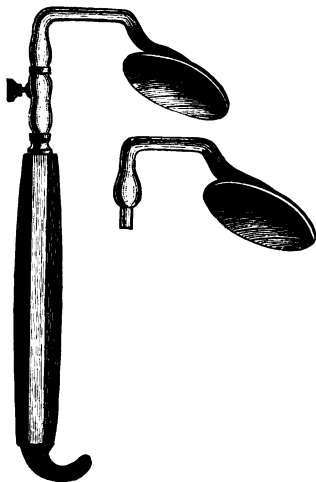


FIG. 18.—Türk's Tongue Depressor.

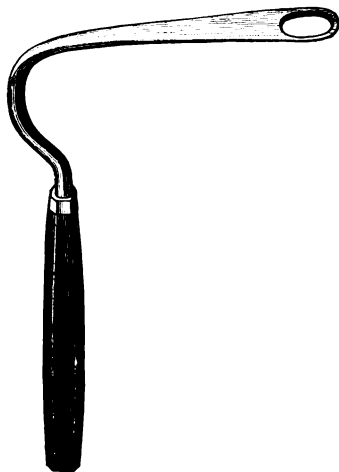


FIG. 19.—Fränkel's Tongue Depressor.

until it lies behind the velum, in the middle line close to, but not touching, the wall of the pharynx. By depressing the handle, or pressing on the spring, the mirror can be made more vertical, and, by various movements of the mirror, the different parts can be successively brought into view.

Certain difficulties may present themselves in the examination. A long hard palate which approaches so nearly the pharyngeal wall as to leave very little space, may render a rhinoscopic examination impossible. Occasionally the tongue

gives difficulty. Some patients tend to arch the tongue upwards towards the palate the moment any examination is attempted (see p. 65). A very common difficulty is the drawing up of the uvula and soft palate against the pharyngeal wall, as soon as the tongue is depressed, or the mirror introduced. To avoid this as much as possible, the patient should be directed to open the mouth, not too widely, but just comfortably, and to breathe *steadily and quietly through the nose*, and to continue to do so while the examination is being made; and although this latter may be impossible when the tongue is depressed and separated from the soft palate, still the effort to continue breathing through the nose will usually cause the soft palate to hang away from the pharyngeal wall. Forced inspiration must be avoided. If the effort to breathe through the nose does not succeed in getting the soft palate forward, an attempt should be made to effect this by getting the patient to emit the French nasal sound *en* or *on*. This will often succeed in giving a view of the parts. If there is great irritability of the pharynx, much training of the patient may be required, before a complete examination can be made. Painting the edges of the soft palate and fauces with a ten per cent. solution of cocaine will diminish the reflex irritability of the fauces; but too much must not be expected from cocaine in posterior rhinoscopy, any more than in laryngoscopy, as with some patients much of the irritability is of mental origin. A steady, skilful hand, and patience, will accomplish much, and as our experience grows, the number of cases which we are unable to examine diminishes.

However, there are cases where the depth of the pharynx is small, and the soft palate is long, and the uvula long and broad, and where an examination can only be made by drawing the palate and uvula forward by mechanical means. For this purpose Voltolini's palate hook (Fig. 20) can be used. The patient depresses his own tongue with the spatula, so as to leave both the operator's hands free. The hook is to be introduced rapidly, and the palate hooked up and drawn forward,

the end of the hook being pressed against the floor of the choanæ. Rapidly applied, firm pressure causes less reflex irritability than light contact. Some training will generally be required before the application of the palate hook is tolerated without exciting spasmodic contraction. Painting the edge and posterior surface of the soft palate with cocaine solution facilitates the use of the palate hook. The same



FIG. 20.—Voltolini's Palate Hook.

purpose may be served by allowing a few drops of the solution to run back along the floor of the nose to the back of the velum.

For operative procedures a self-retaining palate hook is desirable in order to leave one hand free for the necessary manipulation. White's self-retaining retractor (Fig. 21) is a useful form of instrument. The hook consists of a loop of



FIG. 21.—White's Self-retaining Palate Retractor (slightly modified by Baber).

silver wire, which can be changed in shape to suit the individual case. A clamp slides on the shank, carrying two loops of silver wire, which catch over the upper lip at each side of the nose, and retains it in position, thus leaving both hands of the operator free.

In difficult cases where, for diagnostic or operative purposes, it is desired to get the palate well forward, and under

control, the method originally suggested by Störk, of tying the palate forward, may be adopted. For this purpose a piece of cord or catgut, or, better still, of small rubber tubing, is passed through each nostril, and the ends brought out through the mouth. The palate having been drawn forward, the ends are tied over the lip, or passed over the ears, and tied behind the head. This is not a very difficult procedure, and if accomplished quickly and skilfully, is not so disagreeable to the patient as might be imagined.

In cases where an enlarged uvula constitutes the chief hindrance to posterior rhinoscopy, Morell Mackenzie recommends drawing the uvula forward by means of a "twitch," consisting of a small loop of string threaded through a rod four or five inches long. The uvula is engaged in the loop, and a few twists of the rod secure it.

The Rhinoscopic Image.—Only a very limited portion of the boundaries of the post-nasal space is seen reflected in any one position of the rhinoscopic mirror. The mirror has to be shifted in various directions, and possibly withdrawn and re-introduced several times in order to travel over the whole of the picture. A nearly median position is best to take up at first, though that is not always possible, and the mirror may have to be introduced at one side of the uvula first, and then withdrawn and re-introduced on the other side. As in laryngoscopy, where the vocal bands are sought, and serve as a landmark for the region, so in posterior rhinoscopy, the septum is easily recognized, and serves a similar purpose. When the mirror is first raised into a nearly vertical position, the posterior surface of the uvula and soft palate is brought into view. Only a limited view of the posterior surface of the velum is usually obtainable. By inclining the mirror more towards the horizontal direction the septum appears as a sharp, thin ridge of a whitish or yellowish-white colour. Above it widens out, and is of a somewhat redder colour. The lower end of the septum, where it widens as it merges

into the floor, is more or less hidden by the thick upper part of the soft palate. At each side of the septum, about the middle, a symmetrical thickening of a pale yellowish or bluish-grey colour is often seen, which must not be regarded as a morbid condition. By turning the mirror a little sideways the ovoid openings of the nasal fossæ are brought into view, on either side of the septum (Fig. 22). These openings are usually symmetrical, though occasionally slight differences in height and breadth may be observed in the openings of opposite sides. Each opening, or choana, is in great part occupied by the posterior ends of the turbinated

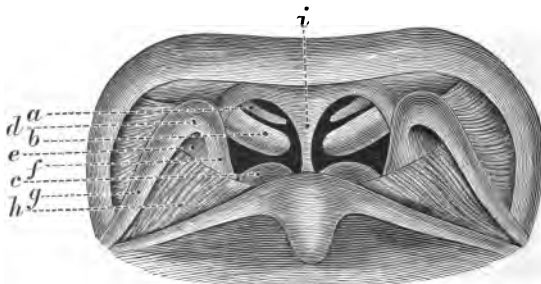


FIG. 22.—Diagram of the Posterior Rhinoscopic Image. (From Burnett after Zaufal.)

a, Superior turbinated body; *b*, middle turbinated body; *c*, inferior turbinated body; *d*, Eustachian cushion; *e*, orifice of Eustachian tube; *f*, salpingo-palatine fold; *g*, salpingo-pharyngeal fold; *h*, levator cushion; *i*, nasal septum.

bodies, which project towards the septum from the outer wall. The most conspicuous is the middle turbinated body, which forms an elongated club-shaped projection, narrowest at its attachment to the outer wall, and enlarging gradually, as it extends inwards and somewhat downwards, towards the septum. It has a greyish or yellowish-red colour, and its surface is usually smooth. The inferior turbinated body is seen below the middle, forming a rounded prominence, the lower part of which is nearly always concealed by the palate, so that the body has the appearance of rising up from the floor of the

cavity. It has an ashy-grey or bluish-grey, or sometimes a bluish-red colour, and its surface may be smooth or uneven, and corrugated. Above the middle turbinated body, the superior turbinated is generally seen, forming a narrow projection, not reaching so far inwards as the middle turbinated. Portions of the middle and superior meatuses * can be seen, but the inferior meatus is concealed by the soft palate.

By bringing the mirror to a more nearly horizontal position, the roof of the naso-pharynx as it slopes down into the posterior wall (vault) comes into view. This region usually presents an irregular surface, owing to the presence of the collection of adenoid tissue known as the pharyngeal, or Luschka's tonsil. This structure varies much in development within physiological limits, and pathological enlargements are frequently seen in young subjects. In the more typical cases, the surface is marked by some six or eight antero-posterior furrows, the intervening folds or ridges being broken in places by cross furrows or depressions. In adults the pharyngeal tonsil has usually atrophied, and its site is merely indicated by little pits or furrows of varying extent. At the lower border of the pharyngeal tonsil, in the middle line, a distinct opening may sometimes be recognized. This, as may be ascertained with a probe, is the orifice of a recess which leads up beneath the tonsil, the so-called median recess or pharyngeal bursa (see p. 19). Below the pharyngeal tonsil the posterior wall presents a more or less marked prominence, formed by the arch of the atlas. The mucous membrane is smooth here, and becomes continuous below with that of the buccal pharynx.

By inclining the mirror to one side, the parts outside and behind the choana, between this and the posterior wall, come into view. Here the Eustachian prominence, pale red in colour, is seen, forming a half-circle with the concavity downwards,

* "Meatuses," as the plural of "meatus," sounds perhaps a little awkward, but it is English at all events. "Meati," which some writers use as a plural of "meatus," is, of course, neither Latin nor English.

and bounding the depression leading into the Eustachian tube. This depression has a somewhat triangular form. From the anterior and posterior lips of the prominence the salpingo-palatine and salpingo-pharyngeal folds pass down in front and behind the depression, while the levator cushion forms the lower boundary. The Eustachian prominence is about on a level with the inferior turbinal, but it mostly appears on a higher level in the rhinoscopic image. It is sometimes thin and projects but little; sometimes it is thick and large, and projects markedly into the naso-pharyngeal cavity. On the outer side of the prominence, between it and the posterior wall, is the depression known as Rosenmüller's fossa. This depression is sometimes bridged over in places by little processes of mucous membrane passing from the Eustachian prominence to the posterior wall.

4. INSPECTION OF THE PHARYNX.

The greater part of the pharyngeal cavity (*i.e.* excluding the naso-pharynx) can be inspected by direct vision. Some of the deeper parts, however, can only be seen with the aid of the laryngeal mirror, while a certain portion cannot be seen owing to its walls lying in contact with each other. The light may be allowed to fall directly on the parts, but it is generally best to use a reflector in the manner already described in connection with anterior rhinoscopy (page 50).

An attempt ought always to be made, in the first instance, to inspect the throat without the help of the tongue depressor. The patient should be directed to open the mouth and take a deep breath. If this does not give a good view, the patient should be got to say "ah!" With most patients, however, it will be necessary to use a tongue depressor, of which there are many varieties. Some of these are made of polished metal, others of vulcanite, and most of them serve the purpose required sufficiently well. It is rather more convenient if the handle of

the depressor is at right angles with the blade, as the hand is thus not liable to get in the line of vision. Fränkel's tongue depressor, already referred to (Fig. 19), is a very good and very generally used pattern. The depressor is to be placed on the centre of the tongue, about halfway back, and the tongue slowly but firmly depressed. If the organ tends to arch stiffly upwards, the patient should be told to keep breathing deeply through the mouth, and the tongue should be slowly but firmly pressed down. It is no use to attempt to press it down quickly and forcibly. If the depressor is placed far back on the tongue, as some direct, and the organ pressed downwards and forwards, no doubt the best view is, in many instances, obtained. On the other hand, many patients are inclined to retch if the depressor is placed far back on the tongue, and it is always better, in the first instance, to try with the depressor not more than halfway back. With some patients all attempts to depress the tongue cause retching. Although these retching efforts curtail the time during which the parts are visible, they are favourable to bringing momentarily into view the lateral folds and the deeper parts of the pharynx.

The parts brought into view by this examination are as follows:—The concave anterior surface of the soft palate is seen presenting a somewhat redder colour than the surface of the hard palate with which it is continuous. The surface is studded with numerous little elevations, sometimes presenting a translucent glistening appearance, formed by the mucous glands of this region, the ducts of which may be covered with drops of mucus. From the centre of the lower margin hangs the uvula, and at each side are seen the folds of the pillars of the soft palate or fauces, the anterior springing from the front of the soft palate near the base of the uvula, and arching downwards to the side of the tongue; the posterior, which is continued from the lower edge of the soft palate, arching downwards and backwards to the side of the pharynx. The posterior fold projects well beyond the anterior, and is therefore plainly

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visible from the front. Any defect or asymmetry in the movements of the soft palate can be observed by making the patient phonate.

Behind the anterior pillar, in the recess between it and the posterior pillar, the tonsil is situated. In health the tonsil does not project beyond the pillars, except perhaps in children. On the other hand, an enlarged tonsil may be adherent to the pillar and not project beyond it. On the surface of the tonsils are seen the rounded or slit-like openings of the lacunæ or crypts.

Between the two posterior pillars is seen the posterior wall of the pharynx, which can be inspected for a variable distance downwards, according to the extent to which the base of the tongue can be depressed. Its surface is usually smooth, red, and shining, but very frequently presents one or more slightly raised flattened prominences (adenoid granules), of varying size and outline, and somewhat redder than the surrounding surface. Small veins and arteries can be seen, generally taking a more or less vertical direction. Occasionally when the tongue is well depressed the tip of the epiglottis is brought into view.

The lateral walls of the pharynx behind the posterior pillars should be inspected. Here a fold of mucous membrane is seen to project inwards to some extent when the patient says "ah," but it is more evident during a retching effort. This lateral fold is the lower end of the salpingo-pharyngeal fold, and is often the seat of thickening and hypertrophic changes.

The lower part of the pharynx, in the region of the laryngeal orifice, cannot be examined by direct vision. Inspection of this part can only be accomplished by the aid of the laryngeal mirror. With the laryngeal mirror we can examine the posterior pharyngeal wall down to where it comes into apposition with the posterior wall of the larynx, and the lateral parts of the pharynx below the level of the tonsil. At

each side of the laryngeal aperture will be seen a depression, the pyriform sinus, bounded internally by the aryepiglottic fold and arytenoid cartilage, and externally by the ala of the thyroid cartilage. It is best seen when the arytenoids are approximated in phonation. This depression is important to examine, among other reasons, because of the occasional lodgment of foreign bodies there.

With the laryngeal mirror we also bring into view the base of the tongue behind the circumvallate papillæ, with the uneven surface of the lingual tonsil.

5. PALPATION.

Digital palpation through the anterior nares is rarely resorted to. Palpation with a probe is, however, very fre-

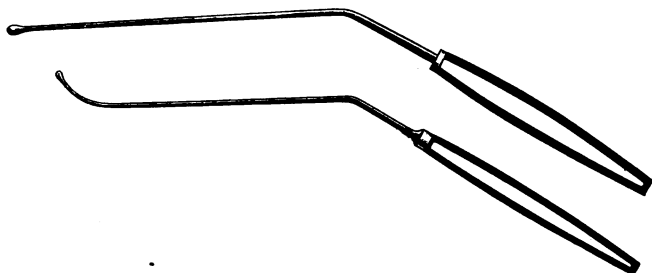


FIG. 23.—Nasal probe.

quently needed, and is, indeed, often indispensable to supplement the anterior rhinoscopic examination. It enables us to determine the consistence of mucous membrane swellings, and the mobility and attachments of new growths, as well as to diagnose foreign bodies, dead bone, and rhinoliths. The probe is also used for exploring the accessory sinuses, the orifices of which can only be reached by this means. A slender, flexible, blunt-pointed probe, mounted on a handle (Fig. 23), is the most convenient form.

Digital palpation of the naso-pharynx is an extremely

important method of diagnosis, and when, as in children, posterior rhinoscopy is difficult, or impossible, we have to depend upon it for much of the information which would otherwise be derived from posterior rhinoscopy. For the purpose of this examination the patient is seated, and the operator stands facing the patient's right side. With his left arm passed round the patient's head, he steadies the latter, while the corresponding hand is free to rest on the patient's chin. The right forefinger is then passed rapidly to the back of the pharynx, between the uvula and pillar of the fauces, and then, with the palmar surface forwards, is carried upwards behind the soft palate. The finger will now feel the hard ridge of the septum nasi in front, and it should be pushed along till it reaches the vault. There is sometimes a little difficulty in getting the finger up behind the soft palate, owing to the contraction of the parts, which takes place when the finger reaches the pharynx. The finger must be kept well against the posterior wall, and gently insinuated by a rotatory motion behind the palate, at one side or other of the uvula. When the finger gets up behind the velum, it is generally grasped rather firmly by the contraction of the parts, but the finger must, nevertheless, be pushed boldly upwards, making sure that it reaches the roof of the space. The uneven surface of the roof will now be felt, and any undue development of the adenoid tissue in that region will be recognized. The prominence formed by the Eustachian cartilage, and the depression leading to the orifice of the tube, and Rosenmüller's fossa can be felt. On either side of the septum the posterior ends of the middle and inferior turbinated bodies can be examined, the latter having often a soft cushiony feel to the finger.

The exploration should be made rapidly, as it is always more or less disagreeable to the patient. It is not easy to recognize the different structures by digital examination without some practice, and it requires long practice to be able to

thoroughly appreciate the condition of the parts during a rapid examination. I do not consider it necessary to place a gag between the teeth for this examination, and I never employ one. Nor do I think it necessary to have any protective covering on the finger. There is no risk of being bitten while the finger is in the naso-pharynx, and it is only necessary to introduce the finger rapidly, and withdraw it rapidly after the examination, to avoid all risk. If, however, it is desired to have some safeguard, it is sufficient to press in the cheek between the teeth. In adults the fauces and naso-pharynx may be painted with a ten per cent. solution of cocaine to render the digital examination of this region less disagreeable.

A probe is sometimes useful to ascertain the condition of parts seen in the rhinoscopic image. A longish silver probe fitted into a light handle, and bent at about a right angle, an inch and a half from its end, is the most convenient form.

Digital examination of the pharynx is useful for the purpose of ascertaining the situation, extent, and attachment of tumours, the consistence of the parts, and the presence of fluctuation. A probe is sometimes useful.

IV. METHODS OF TREATMENT.

Most of the methods of treatment referred to in this section are applicable to many different affections of the throat and nose, and it will save repetition, therefore, to consider them together. Many other special methods and instruments will be described in the course of the work, in connection with particular diseases. Only methods of local treatment will be referred to.

1. APPLICATIONS TO THE SKIN.

External applications to the throat are often useful. They are similar to the applications used in other regions, and need no special description in this work. They include such remedies as leeches, blisters, rubefacients, pigments, compresses, poultices, etc. The application of cold to the outside of the throat is often used to check inflammation in the early stage. This may be applied by means of ice-bags, or cold wet compresses frequently changed. Long narrow ice-bags are sold for the throat. They form a kind of collar for the front and sides of the neck, and are often useful. The best means of applying cold, however, is the apparatus known as the Leiter's coil. This apparatus is, indeed, adapted for applying either heat or cold. It consists of a coil of pliable leaden tubing, which can be adjusted to the front of the neck, and through which a stream of water of any required temperature can be kept constantly running. For a cold application a temperature of 55° F., or 60° F., is generally sufficient with this apparatus. Wet compresses are often applied to the throat in subacute inflammatory conditions and the later stage of inflammation.

The compress is made of folded linen or lint, dipped in cool or cold water, and placed on the neck covered with oiled silk, or other waterproof material, or simply with a dry cloth.

2. FLUID MEDICATION.

Sprays.—A spray is a very useful form for applying fluids to the interior of the nose, whether the object be to cleanse the cavity of crusts and secretions, or to bring certain indicated fluids in contact with the mucous membrane. The spray-producers most commonly used are worked by an india-rubber hand-ball. When it is merely desired to bring some medicated fluid in contact with the mucous membrane, a small spray apparatus, throwing a fine spray, and worked by a single hand-ball, is sufficient. If, however, the spray is used for cleansing purposes, a second hand-ball is desirable in order to



FIG. 24.—Spray-Producer, and Nozzle for Posterior Nares.

establish a continuous spray. For this purpose, too, a spray-producer throwing a powerful *coarse* spray is the most efficient. Most of the spray-producers sold throw far too feeble a spray to be of much use for cleansing purposes. Powerful spray apparatus have been designed by American physicians, worked

by compressed air in a metal cylinder, charged by means of an air-pump.

The direction of the spray-tube will vary according to whether the spray is to be directed through the anterior or posterior nares (Fig. 24). The posterior nasal spray-producer is rarely used, as by means of the anterior form the nasal passages as well as the naso-pharynx can generally be thoroughly treated. A spray-producer with a vulcanite nozzle is best, and the nozzle is generally made to point slightly upwards for use in the anterior nares, although a horizontal nozzle does very

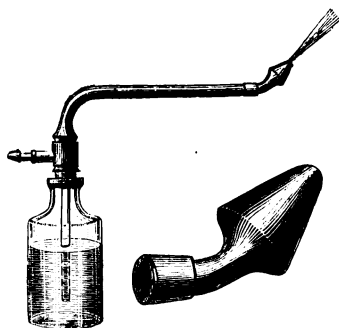


FIG. 25.—Lefferts' Spray-Producer, with Conical Nozzle.

well if the bottle is slightly tilted. A conical nozzle (Fig. 25), which is large enough to fit more accurately into the orifice of the nostril, is often useful when the object is to clean the passages of crusts and secretions.

Fluids used for spraying the nasal passages should be slightly warmed to about the body heat. This can be done by standing the bottle con-

taining the fluid in warm water for a few minutes.

Lefferts gives the following practical directions for *cleansing* the nasal cavities with the spray:—

1. Warm the medicated fluid in the bottle before using, by holding the bottle for a few minutes in hot water.
2. Hold the body erect, and incline the head very slightly forward over the toilet basin.
3. Introduce the conical nozzle of the apparatus into the nostril, first on the side most occluded, far enough to close it perfectly, holding at the same time the horizontal tube of the apparatus directly outwards from the face; do not turn it from side to side or downwards.

4. Open the mouth widely, and breathe gently through it, in a snoring manner; avoid all attempts at speaking, swallowing, or coughing. At the moment that the fluid passes from the nostril operated upon, into the upper part of the throat, a desire to swallow will be experienced; resist it; and the next second the fluid will pass forwards through the opposite nostril.

5. Hold the ball of the apparatus firmly in the right hand, while the left holds the bottle, and work it briskly, until the medicated fluid, which should be felt at once to enter the nasal passage, has passed around it, and appears at the opposite nostril; stop at this moment.

6. Remove the nozzle from the nostril; allow the superfluous fluid to run out of the latter, and blow the nose gently, *never vigorously*.

7. Repeat the operation upon the opposite nostril.

Sprays are less frequently used in pharyngeal disease. Any ordinary spray-producer with a horizontal nozzle, worked with a single or double hand-ball, serves for applying a spray to the pharynx. The nozzle is introduced far enough to prevent the spray going over the face. If desired, a glass or vulcanite tube can be used to protect the tongue or cheek.

Oily liquids diffused in a finely-pulverized form are sometimes employed in nose and throat affections, either for the effect of the oily substance itself or as a means of applying certain medicaments, such as menthol, eucalyptol, etc., which are not sufficiently soluble in



FIG. 26.—Oil Atomiser.

water. Fig. 26 shows a well-known form of spray apparatus which throws an exceedingly fine vapour of oily

fluid. It can be obtained fitted with a post-nasal nozzle if required.

Nasal Douche.—When a stream of fluid is propelled into one nostril, while the patient holds the head erect and breathes through the open mouth, the liquid passes over the contracted soft palate, and out through the opposite nostril. On this principle a continuous stream can be passed through the nasal passages by using an india-rubber tube, with a nozzle at one end, fitting into the nostril, the other end being placed in a vessel of water, raised above the level of the patient's nose. In the ordinary simple form of apparatus (Fig. 27) the tube

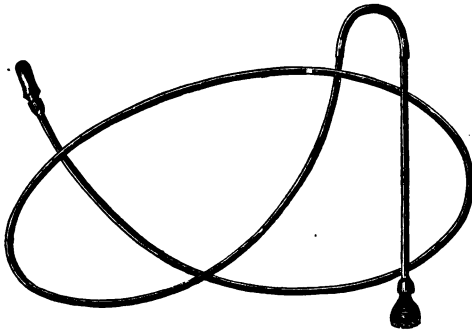


FIG. 27.—Nasal Douche.

is filled by suction, or by pouring the fluid into it. A more convenient form of douche is also made containing an elastic ball in the circuit of the tube, by which the fluid can be sucked in, and a stop-cock, by which the stream can be cut off when required.

The nasal douche is undoubtedly a most effective method of cleansing the nasal passages of secretions and crusts. It is true that the stream passes along the floor of the nasal cavity, and does not reach the higher parts, unless, indeed, it enters at a high pressure. It is acknowledged that a stream entering thus with great force is dangerous, on account of the liability

of fluid being forced into the Eustachian tube, and perhaps into the accessory sinuses. The danger to the Eustachian tube has caused some physicians to discountenance the use of the douche altogether. Still, if the proper directions be given to the patient, and observed by him, the douche will be found a perfectly safe method of cleansing the nasal passages. The following are the points to be observed in using the douche, and they in some measure apply to all methods of irrigating the nasal passages:—

1. Too high a pressure of fluid must not be used. The vessel containing the fluid should not be raised higher than the forehead. The nozzle is to be inserted and kept in a direction parallel to the floor of the nose, and not directed upwards.

2. The head is to be kept in a nearly upright position, but inclined slightly forwards. A too forward or too backward position favours the entry of fluid into the frontal sinuses, and the Eustachian tubes, respectively.

3. The patient is to avoid swallowing, and for this purpose it is well to interrupt the stream frequently, until the patient has become habituated to its use, and has learned to breathe easily through the mouth, while the stream is passing through the naso-pharynx.

4. If one nasal passage is narrower than the other, the stream should be directed into the narrower passage, so as to secure a free exit. If either passage is completely obstructed, of course the douche is out of the question. The nasal douche ought never to be prescribed until a careful examination of the nasal passages has been made.

5. The superfluous fluid should be allowed to escape before blowing the nose.

6. The fluid used should always be slightly warmed, and should not be too highly medicated.

As to the quantity to be used, about half a pint is sufficient, until the patient has become proficient; afterwards, a pint or more may be used, each time.

Dr. Pins, of Vienna, introduced a simple form of nasal douche which I have tried, and found very satisfactory. The apparatus* (Fig. 28) consists of a bottle of suitable size fitted with an india-rubber cork, through which pass two glass tubes of unequal length. The longer tube reaches to the bottom of the bottle, and is fitted at its upper end with an olive-shaped nozzle to fit the nostril. The shorter tube does not quite reach the upper surface of the fluid, and its upper end is bent to form a mouth-piece.



FIG. 28.—Pins's Douche.

The patient takes the mouth-piece between the lips and fits the nozzle into one nostril. He then blows into the bottle *with cheeks distended*, and the fluid is forced up into the nose and out at the other nostril. With short pauses for respiration a pint or more of fluid can be passed through the nose in a few minutes. Most patients, and even children, very readily learn to use this apparatus, and I have found less

tendency to choking and coughing than with the ordinary douche.

Syringes.—Fluids may be conveniently directed into the nasal passages with a syringe, and on the whole this is the readiest and most convenient method of cleansing the nasal passages. A two or three ounce rubber syringe, with a conical vulcanite nozzle, is the most convenient (Fig. 29). A

* It can be obtained from Mayer and Meltzer, 71, Great Portland Street.

Higginson's syringe can also be used. In using the syringe the patient keeps the head erect, and inclined very slightly forwards. If he be directed to breathe with the mouth open while the fluid is passing, the stream will pass down the other nostril, as with the douche. Care must be taken not to use too great force. All fluids must be used warm, and most of the directions given above in connection with the douche are applicable here. When there is nasal obstruction a syringe with a narrow nozzle, which will permit a free return of fluid, can be used.



FIG. 29.—Nasal Syringe.

An ordinary barrel syringe with a long, curved tube is occasionally used for the posterior nares. The nozzle should have coarse perforations so directed that, when in place, it may throw a stream directly forwards, or, better still, in all directions. The post-nasal syringe is the most effectual means of removing firmly-impacted crusts from the vault of the pharynx, in ozæna, etc.; but it must be admitted that few patients are found to tolerate its employment.

In certain cases the nose and naso-pharynx are most conveniently cleansed by passing a No. 4 or No. 5 catheter along the floor of the nose as far as the naso-pharynx. A syringe is attached to the catheter, and a stream is injected in this manner, which flushes out the naso-pharynx and carries the secretion out through the anterior nares.

Hand Washes, etc.—In poor practice, where apparatus cannot be obtained, or as a temporary expedient, fluid may be introduced into the nose from the hollow of the hand, or from a glass or spoon. The sniffing up of fluids is, however, an unsatisfactory method, and often gives rise to pains in the head and other discomforts. The patient should be directed not to sniff up forcibly, but to hold the head well forward while gently

sniffing up, and then gradually throw it well back. Various forms of irrigators are sold, from which fluid may be poured into the nose. In using these, the head should be kept in the same position as for the douche.

Gargles.—The process of gargling is too familiar to need description. It must be borne in mind, however, that in many, perhaps in the majority of cases, the liquid used as a gargle does not go beyond the base of the tongue and anterior pillars of the fauces. Even in such cases, however, the frequent use of an antiseptic gargle may be very useful, though it acts as little more than a mouth-wash. Persons who are skilful at gargling, however, can make the fluid penetrate into the pharynx, so as to touch the tonsils and a small portion of the posterior wall of the pharynx. It is indeed possible, as was first demonstrated by Guinier, to allow the gargle to enter, not only the pharynx, but the aperture of the larynx, so as to bathe the supraglottic portion of that cavity. This method of *laryngeal gargling* may be carried out by an intelligent patient who complies with the following instructions. 1. Take a small quantity of fluid in the mouth and slightly raise the head. 2. Protrude the chin and lower jaw so as to raise the epiglottis. 3. Open the mouth and emit the sound "Eh." By this means the fluid finds its way into the upper part of the larynx, where it can be retained so long as the breath is held. Very few people, however, can acquire the art of laryngeal gargling.

Gargles are mostly directed to be used at the ordinary temperature, but I think that warm gargles are, as a general rule, better than cold, and are often more agreeable to the patient. It is convenient for this purpose to prescribe double strength, and direct equal parts of hot water to be added each time. For promoting maturation of abscesses, gargles, as hot as can be comfortably borne, are generally indicated.

3. INHALATIONS.

The steam of hot water at a temperature of about 140° is often inhaled, either alone or charged with volatile medicinal agents, in the treatment of throat affections; less often, however, for pharyngeal than for laryngeal affections. Volatile agents are also used for inhalation alone, without admixture with steam.

For administering steam inhalations an ordinary jug may be used. The jug is filled almost half full of hot water (at about 140°), and a folded towel is arranged round the top of the jug, into which the patient adapts the mouth and nose while inhaling. The steam may be medicated by the addition

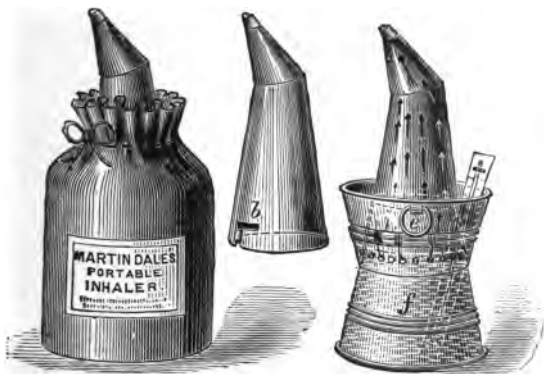


FIG. 30.—Martindale's Portable Inhaler.

On the left of the figure the inhaler is shown ready for use with a woollen covering. On the right it is shown without the cover, and in the centre the upper part is disconnected from the lower chamber.

to the water of various substances, such as carbolic acid, tincture of benzoin, or pine oil. When, however, such medicinal agents are employed, it is better to use some form of inhaler, in which the inhaled air not only passes over the surface of, but is drawn through, the hot water. Martindale's portable inhaler (Fig. 30) and Maw's inhaler (Fig. 31) are well-known apparatus for the purpose.

The vapours of certain drugs without the admixture of

steam may be employed by impregnating a sponge or cotton-wool with the drug, and bringing it in front of the mouth and nose on a Coghill's inhaler. The vapours may be inhaled through the mouth alone by means of Martindale's ozonic inhaler, or through the nose alone by Martindale's nasal ozonic inhaler. The fumes of nascent chloride of ammonium, which are generated by bringing together the vapours of ammonia and hydrochloric acid, are often used for inhalation. There are several different kinds of chloride of ammonium inhalers now sold, such as Godfrey's and Vereker's, which serve the purpose very well.



FIG. 31. —Maw's Inhaler.

4. INSUFFLATION OF POWDERS.

Finely-pulverized medicaments may be introduced into the nose and throat by means of any of the different kinds of insufflators which are now in common use. For the naso-pharynx an insufflator with a nozzle bent near the end is necessary (Fig. 32). In some cases it is desirable to introduce a certain limited quantity of powder, and for this purpose insufflators are used in which the exact quantity of powder can be placed. Simple insufflators of this kind for the anterior nares are made with a

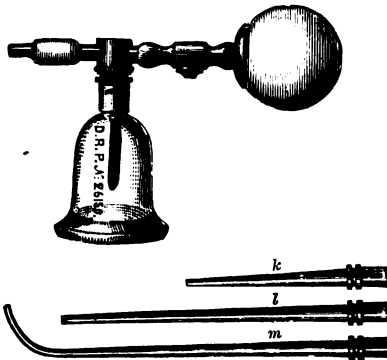


FIG. 32.—Insufflator for Throat and Nose.

glass or vulcanite tube provided with a piece of india-rubber tubing and a mouth-piece (Fig. 33). The powder is inserted into the tube through an opening near the nasal end, and this opening is then closed with the fingers. For the naso-pharynx

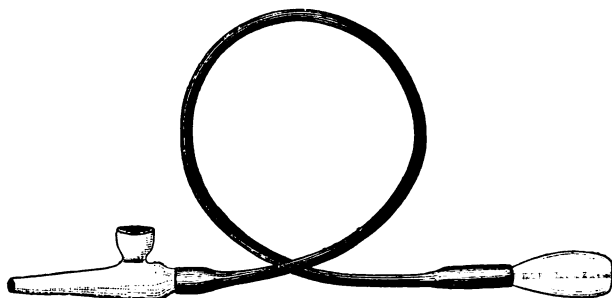


FIG. 33.—Nasal Insufflator.

a long curved tube is used, with an opening in the side for the insertion of the powder, and fitted at the proximal end with a piece of india-rubber tubing (Fig. 34). Either form may be



FIG. 34.—Naso-pharyngeal Insufflator.

made so as to be worked by an india-rubber ball instead of by the mouth, and this form is preferable.

5. APPLICATIONS WITH BRUSHES, COTTON HOLDERS, ETC.

A camel's-hair brush is sometimes used to make direct applications to the throat or nose, or to cleanse the surface of the mucous membrane. For the naso-pharynx the handle must be bent towards the extremity at a right angle. For most purposes, and especially for the nose, the cotton holder is much more convenient. This consists of a probe mounted on a

handle, and roughened near the point, so as to hold a pledget of cotton-wool wrapped round it. The probe can be bent at any angle required. Nitrate of silver is best applied by fusing it on the end of a probe, or metal rod, bent at a suitable angle. This is safer than using a caustic holder, especially for the naso-pharynx. Chromic acid can also be melted on the end of a probe, but this substance must be cautiously heated, as too great heat will decompose it. Chromic acid crystals, however, being deliquescent, will adhere readily to the end of a probe, without heating. Chromic acid in solution, acetic acid, and other fluid escharotics, may be applied with a glass rod, a probe dressed with cotton, or with some form of guarded canula.

6. LOZENGES, PASTILLES, ETC.

The direct action of various drugs upon the throat can be obtained by means of lozenges, or jujubes containing a certain quantity of the drug. These should be allowed to dissolve slowly in the mouth, so as to prolong the local action as much as possible. The disadvantage of this form of remedy is that its effect on the throat is necessarily combined with a local action of the drug on the stomach, as well as with a general effect, which may not always be desirable. Sometimes, however, remedies are prescribed in this form for the general as well as the local action.

The local action of ice in inflammatory processes of the throat is often sought by administering small pieces of ice to suck, and nutrient ices may also be beneficially used in such cases.

7. THE ELECTRIC CAUTERY.

The electric cautery is the most efficient, as well as the most delicate destructive agent we possess in the treatment of diseases of the throat and nose. Convenient portable batteries are now sold at a moderate price. A set of Schech's electrodes,

including a snare-tube and platinum points, of various shapes, comprises all that will be required. These are all adapted for fastening into a universal holder.

In using the galvano-cautery it is important to remember that a cherry-red heat is the proper one. A very intense white heat is more liable to be followed by hæmorrhage, while a dull red heat causes more pain. The electrode should be applied to the part cold, and then the current turned on. When the required cauterization has been performed, the point should be withdrawn as the current is turned off. If the point is allowed to cool while *in situ*, it is apt to adhere and tear the tissues as it is withdrawn, causing hæmorrhage. If it is felt to have adhered, it is best to turn on the current again before withdrawing the point.

8. LOCAL ANÆSTHESIA.

Cocaine, as a local anæsthetic, is indispensable in the treatment of diseases of the throat and nose. A solution of hydrochloride of cocaine of ten per cent. strength is enough for most purposes, but complete anæsthesia is obtained more rapidly and effectually by means of a twenty per cent. solution. Cocaine solutions should not be applied by means of a spray-producer, but should be applied directly to the part with a brush or cotton holder. The full effect is produced in four or five minutes after the application, and continues for about ten or fifteen minutes, and the effect mostly disappears within half an hour. McBride lays stress on applying the brush with some energy, as the more thoroughly the part is brushed, the more complete is the resulting anæsthesia. The sub-mucous injection of cocaine is sometimes practised preparatory to intra-nasal operations. From two to five drops of a ten per cent. solution may be injected under the mucous membrane at the site of the operation.

In addition to its anæsthetic effect, cocaine produces temporary contraction of the blood-vessels in the parts to which it is applied. This ischæmia, which is especially marked on

the cavernous tissue of the nose, gives increased facility for inspection and manipulation. A four or five per cent. solution is sufficient for this purpose. The utility of cocaine in posterior rhinoscopy has already been alluded to. The anæsthetic effect of cocaine is sometimes utilized for the relief of certain painful diseases of the throat.

I may repeat what I have stated in former editions of this work, that I have never met with marked toxic symptoms after applying cocaine, even pretty freely in ten or twenty per cent. solutions, to the throat or nose. Cases, however, have been reported where its application has been followed by general toxic symptoms, such as faintness, giddiness, dryness and constriction of the throat, dilatation of the pupils, rapid pulse, and slight cyanosis. In most of these cases, I think, the cocaine has been applied with a spray-producer.

Chiefly on account of the occasional toxic effects of cocaine, the hydrochloride of eucaine has been recently recommended as an efficient substitute in producing local anæsthesia. It is used in solutions of from five to ten per cent., in the same manner as cocaine. It appears to have almost equal local anæsthetic effects, but it takes longer to produce the full effect. It also has a similar effect in reducing engorgement of the turbinal tissue, but the effect is not so complete. It appears to have no general toxic effects.

Menthol has a local anæsthetic effect on the mucous membranes; but the anæsthesia is not at all comparable to that of cocaine. Menthol is only sparingly soluble in water, but soluble 3 in 2 of rectified spirits, and is also freely soluble in olive oil and liquid paraffin (paroleine, glymol, etc.). A twenty per cent. solution in spirit, painted on the mucous membrane, produces anæsthesia and contraction of the vessels. The immediate effect of this application is, however, often painful. A twenty per cent. solution in an oily liquid irritates much less.

Antipyrine, applied in thirty or forty per cent. solution, has

a decided anæsthetic action on the mucous membrane, inferior in degree, however, to that of cocaine. This application causes a momentary pain, which passes away in a few seconds. The duration of the anæsthesia is more prolonged than that of cocaine, lasting an hour and upwards. For this reason it is recommended as an analgesic in certain painful throat diseases.

PART II.

DISEASES OF THE NOSE, NASO-PHARYNX, AND ACCESSORY SINUSES.

I. CUTANEOUS AFFECTIONS.

ONLY a few points need be referred to in connection with affections of the skin which covers the exterior of the nose and lines its vestibules, as these affections in general follow the same course and require the same treatment as those which attack the skin of other parts of the face.

Eczema, inside and around the nasal orifices, is a pretty common complaint. Acute eczema is more commonly met with in children, and is often the result of some nasal discharge. It may be attended with profuse secretion and crust formation, and the nares may become completely blocked up with yellow or blood-stained crusts. The neighbouring skin of the nose and upper lip may become very painful and swollen. The surface beneath the crusts is red, moist, and prone to bleed. Deep cracks are often present. Chronic eczema, like the acute form, is often the result of some abnormal nasal discharge. In long-standing cases the skin about the nasal orifices may become chronically thickened and infiltrated. Thin adherent crusts often form within the alæ and on the fore part of the septum. **Cracks** or fissures in the skin at the nasal orifices are often met with in association with eczema, or, if met with independently, their origin often dates from an attack of eczema. They occur usually in the angle between

the ala and columna in front, or between the ala and fore part of the floor of the nose behind. These cracks may be very painful, and are often very chronic and difficult to heal. The treatment of eczema of the anterior nares does not differ materially from that of eczema elsewhere. The removal of crusts from the nasal orifices must be especially attended to. If eczema be dependent on nasal discharge, the condition of the interior of the nose must be simultaneously treated. For the treatment of obstinate and painful fissures in the nasal apertures, nothing gives better results than touching them from time to time with a pointed stick of nitrate of silver.

A general thickening and enlargement of the nose sometimes results in children and young people from frequently-recurring attacks of dermatitis of an erysipelatous character. The upper lip and neighbouring part of the cheek may be affected by these attacks and share in the hypertrophic thickening resulting therefrom. The attacks occur at intervals of days, or weeks, or months, the swelling of the parts not always subsiding in the intervals between the attacks. After a variable time the susceptibility to the attack disappears, but a more or less marked permanent thickening of the nose and adjacent parts may remain. The attack, when originating on the nose, usually commences on one or other side of the dorsum, with redness and swelling, which spreads thence on to the cheeks and upper lip. After three or four days the redness and swelling subside, slight desquamation of the skin sometimes following. There are little or no constitutional symptoms. Whether these attacks, which may be termed lymphangitis, are identical with true erysipelas, though of slighter intensity and more fugitive character, is doubtful. The important point to remember is that the tendency to these attacks is usually associated with a chronic eczema, and especially with cracks or fissures in the skin about the anterior nares. Such cracks may obviously form a point of entry for erysipelatous or other poisons into the lymphatics of the skin, and true facial

erysipelas may often be traced to such conditions. It is important, therefore, to treat these fissures, in the anterior nares especially, by applications of solid nitrate of silver.

Sycosis may attack the hair follicles within the vestibules. It is chiefly met with in men, and usually in conjunction with sycosis of the upper lip, though it may occur independently of the latter. It results in many cases from the irritation of some chronic, or oft-recurring, nasal discharge. The treatment is the same as for sycosis elsewhere, but epilation is more painful, and cannot be employed except for the looser hairs, without danger of setting up an undesirable amount of local irritation and swelling.

Furuncles not infrequently form within the nasal orifices. A furuncle in this region is often traceable to a chronic eczema or sycosis, and very often the point of entry of the infection is some chronic fissure or erosion in the skin around the orifice. The formation of a furuncle is always attended with considerable pain, mainly due to the density of the areolar tissue in the ala nasi. It generally points inside the nasal aperture, but it may break externally. A furuncle is very apt to recur after a variable interval. As soon as the site of the furuncle is determined, and the process seems sufficiently advanced, an incision should be made, internally or externally, as the case may require, and the necrotic contents evacuated. To prevent recurrence, it has been recommended to wash the skin every two or three days with a weak solution (1 in 5000) of bichloride of mercury.

Acne rosacea is a familiar and troublesome affection of the skin of the nose. Three grades of the disease are recognized, but many cases never pass beyond the first, and very few pass beyond the second grade. The earliest stage consists of redness of the nose. This redness is transitory at first, appearing perhaps only after meals, or about the menstrual period in women, but after a time it becomes permanent, and small dilated veins become visible about the tip and alæ

of the nose. The nose, at the same time, has often a greasy appearance, owing to the presence of more or less seborrhœa, and many of the ducts may be seen plugged with sebum. After months or years the second stage is reached, in which, in addition to the rosacea, or permanent hyperæmia, there is true acne; papules, pustules, and tubercles developing, which can mostly be shown to originate in the sebaceous glands. These papules, or pustules, may be many or few in number. Some thickening of the skin of the tip and alæ of the nose, is also present. The third stage, which is not often reached, consists in a marked hypertrophy of the tissues of the skin, the blood-vessels being at the same time enormously distended, and the parts of an intensely red or purple colour (*Acne hypertrophica*). In extreme cases, the growth of connective tissue and blood-vessels goes on to the production of very great deformity. The nose may be converted into a large red, or purple, uneven, tuberculated, or lobulated mass.

This affection occurs in both sexes, but the lesser grades are more frequent in women, while the more marked forms are usually only reached in the male sex. Uterine disorders are frequently the cause in women, and the disease is especially common about the menopause. Dyspepsia undoubtedly in many cases gives rise to acne rosacea, the dyspepsia being characterized in such cases by a tendency to flushing after meals. Excess of alcohol is a frequent cause of acne rosacea, especially of the advanced stages. Feeble circulation, debility, nerve prostration, exposure to inclement weather, are all, at times, important factors in its production.

While all the above causes, and some others, may contribute to the development of acne rosacea, it is of principal importance here to point out that the complaint, more especially the first stage, is sometimes due to intra-nasal disease, chiefly to the various forms of chronic rhinitis, and may be cured by treatment of the same; while so long as the nasal disease is unrelieved, other remedies for the acne have little or no avail.

The nervous and vascular connection between the mucous membrane of the nasal passages, and the integuments of the nose, will probably account for the interdependence, which, whatever be the explanation, certainly exists.

In treating the disease, the cause must, as far as possible, be determined and remedied. While, therefore, we direct our inquiries to the subject of the patient's habits, diet, digestion, and catamenial functions, the condition of the interior of the nose must not be altogether forgotten. Where there are obvious nasal symptoms, our attention will be more readily directed to the interior of the nose as a probable cause. But even where the symptoms are of a latent character, a careful examination of the interior of the nose ought not to be omitted, in any obstinate case of the affection. Treatment of the nasal trouble may of itself cause the disappearance of the cutaneous redness. In most cases we have to treat other causative conditions. Attention to the diet is always important. Alcohol is mostly better avoided altogether. Medicinally, soda, bismuth, calumba, and gentian, in various combinations, are most useful. Constipation should be corrected. The uterine functions should be regulated. Local treatment is often important. In proportion to the implication of the sebaceous follicles, weak sulphur ointments and lotions are useful. These are best applied at night, after washing the skin with soap and hot water. In the day a more soothing application, such as a calamine or bismuth lotion, may be applied. Dilated vessels are best treated by incision, or electrolysis.

II. NASAL OBSTRUCTION (**Nasal Stenosis**).

THE nasal passages and naso-pharynx may be narrowed in various ways, and the chief conditions leading to such stenosis, as well as the symptoms of obstruction resulting therefrom, are described in various sections of this work. The results vary somewhat in relation to the nature and seat of the obstruction, the duration of the state, and the age at which it occurs. There are many important symptoms, however, common to all forms, and it will be an advantage, in many ways, to review the subject as a whole in the present section.

The following are the chief causes which give rise to nasal obstruction :—

I. Nasal Causes.—1. Congenital closure of the nostrils by a membranous structure, and congenital membranous or bony closure of one or both posterior nares. These malformations are rare.

2. Acute rhinitis and membranous rhinitis (diphtheritic or non-diphtheritic).

3. Turgescence of the so-called cavernous tissue of the inferior turbinated bodies, and hypertrophy of the nasal mucous membrane, especially of that covering the inferior turbinated bone.

4. Inflammatory enlargement of the middle turbinated body (ethmoiditis), and distension of this body by a cyst containing air or fluid.

5. New growths of various kinds (mucous polypi most frequently), whether commencing in the nose or invading the nose from the neighbouring sinuses.

6. Syphilitic periostitis and gummata.
7. Deviations and outgrowths of the septum.
8. Abscess and hæmatoma of the septum.
9. Foreign bodies, rhinoliths, loose sequestra of bone, and inspissated secretions.
10. Cicatricial narrowing or adhesions of the nasal passages, from syphilis, lupus, or injudicious use of caustics.

II. Naso-pharyngeal and Pharyngeal Causes.—

1. Hypertrophic conditions of Luschka's tonsil (adenoid vegetations).
 2. Naso-pharyngeal polypi and tumours of various kinds.
 3. Gummatous deposits, tumours and abscesses involving the soft palate or posterior pharyngeal wall.
 4. Cicatricial adhesion of the soft palate to the pharyngeal wall.
 5. Enlargement of the faucial tonsils, resulting from acute inflammation or chronic hypertrophy.

It may be added that by far the commonest cause of chronic nasal obstruction in children is hypertrophy of Luschka's tonsil (adenoid vegetations). In adults, the commonest causes are deformity of the septum and hypertrophic rhinitis, and, next to these, mucous polypi.

Symptoms.—One immediate consequence of a certain amount of narrowing of the nasal passages is a feeling of discomfort, which the patient tries to relieve by frequently snuffing and attempts to blow the nose. In certain forms of stenosis, such as that resulting from polypi, the discomfort will be greater in damp weather, from an increase in the obstruction. From interference with the expulsive force of the expiratory current, the removal of the secretions will be rendered more difficult, and these tend to accumulate, and further increase the obstruction. Excessive discharge of secretion, either anteriorly or posteriorly, usually coexists with all forms of nasal stenosis, and the importance of relieving stenosis, in order to effect a cure in cases of nasal or naso-pharyngeal catarrh, cannot be

too strongly insisted upon. It is constantly noticed that when from any cause one passage is blocked, the mucous membrane in the other passage becomes hyperæmic and swollen, and this passage tends to become obstructed.

Apart from these local troubles, the effects of nasal stenosis may be considered in relation to the chief functions with which the nose is connected, viz. respiration, smell, taste, voice, and hearing.

Respiration.—The air which enters and leaves the chest, in respiration, passes in the normal condition through the nose. The inspired air, in its passage through the nose, is warmed, moistened, and purified. If this channel is impeded, mouth-breathing takes the place of nasal breathing. It must be remembered that it is not necessary that there should be complete obstruction to the passage of air for mouth-breathing to be established, but a stenosis of apparently moderate degree is sufficient to bring this about. From a mere inspection of the passage it is indeed by no means easy to determine if there is stenosis sufficient to cause mouth-breathing. On the one hand we find patients, habitual mouth-breathers, in whose passages we detect no very marked narrowing, and on the other we find apparent narrowing without mouth-breathing. The arched course of the air-current through the nose, which has already been described (p. 33), and the somewhat complicated form of the structures bounding the nasal fossæ, render it difficult to judge from inspection as to the amount of impediment which exists to the passage of the respiratory current. The mere fact that a patient can breathe through the nose while his attention is directed to it, is not sufficient, unless we find on inquiry that he does so habitually and unconsciously both day and night. If nasal respiration is interfered with, a more or less troublesome train of symptoms is apt to ensue. It is, of course, only in cases of long-continued chronic nasal obstruction that most of these troubles come into prominence.

The absence of the warming, moistening, and purifying

influence of the nose on the inspired air tends to the occurrence of various disturbances in the respiratory passages. Dryness of the mouth and pharynx, especially on waking in the morning, is often complained of. Chronic pharyngitis not unfrequently develops. The larynx, and lower air passages, are also apt to suffer, laryngitis and bronchitis being frequently associated with nasal obstruction.

The mouth-breathing habit, which necessarily results from chronic nasal obstruction, gives a characteristic appearance to the face, especially marked if developed in early childhood. The general expression of the face is vacant and listless. The lower jaw is always slightly dropped to maintain the mouth open. The nose is pinched in, and the alæ are flattened against the septum, and wasted. The upper lip is often shortened, and slightly everted, the upper front teeth being thereby exposed. A peculiar formation of the upper jaw is also associated with chronic nasal obstruction in childhood. This takes place mainly after the commencement of the second dentition. The alveolar arch is narrowed from side to side, and elongated from before backwards, and the arch of the palate is higher than normal. The whole of the upper jaw is apt to be backward in its development. With the compression of the alveolar arch from side to side, the normal position of the teeth is disturbed. The central incisors are thrown forward, and the lateral incisors and canines are crowded irregularly together and forced out of position (see p. 161). Mouth-breathing also conduces to an unhealthy condition of the teeth and gums. Caries of the teeth is common in mouth-breathing subjects.

There appears to be some relation between deviation of the nasal septum and the high arched palate associated with nasal obstruction. The two conditions are certainly frequently present together, and deformities of the septum are chiefly observed after the seventh year, when the deformity of the palate becomes pronounced.

If the nasal obstruction be at all complete, exertion will cause some apparent labour in breathing. Indeed, these persons are apt to breathe noisily at all times, but especially in eating or drinking, for while the mouth is engaged with the food or drink, their breathing is interfered with, and thus becomes noisy and gasping. In infants, however, this difficulty reaches its height. The attempt to take the breast or bottle produces suffocative attacks, which compel the infant to stop sucking almost immediately it has begun. Serious interference with nutrition may result from the inability to suck.

During sleep the current of air passing through the mouth causes the uvula and edges of the velum to vibrate against the root of the tongue, and produces snoring.* Sleep is thus apt to be disturbed, and nightmare is not uncommon. In infants and young children severe attacks of dyspnoea, or even violent suffocative attacks, occur during sleep, the tongue falling back to its natural position against the hard palate, and intercepting the breathing. In some cases the tongue is probably drawn back by the inspiratory movement, and presses the epiglottis down on the larynx. The child starts up partially suffocated, and struggling for breath. The attacks may have a resemblance to croup, and are sometimes described as such by parents. It has been suggested that the vigorous attempts at inspiration may give rise to acute hyperæmia of the lungs in young children, and so intensify the dyspnoea. The attacks appear sometimes to partake of the character of definite asthmatic paroxysms. It is probable, also, that nasal obstruction, in infants, plays an important part in the production of collapse of the lungs. Suffocative attacks are rare in adults, who more

* Snoring is not exclusively associated with buccal respiration in sleep. The relaxed soft palate in sleep may lie in the course of the usual respiratory current, and its edges be set in vibration by it. This is particularly apt to occur when the mouth is open during sleep, although respiration is being carried on through the nose for the time being; but it may occur with the mouth quite closed.

easily acquire the knack of breathing through the mouth in sleep. They do, however, occur. Definite asthmatic attacks occur fairly often in association with nasal hypertrophies and nasal polypi. They are not, however, by any means always nocturnal, and they perhaps arise mainly in a reflex manner (see Reflex Nasal Neuroses).

Chest deformity, consisting of a sinking in of the lower costal cartilages and prominence of the upper part of the sternum, which has long been described as associated with large tonsils, may arise from any form of nasal obstruction in young children, and has been especially noticed in association with adenoid vegetations. It has been objected that, although large tonsils may produce the deformity, since they interfere with the inspiratory effort by obstructing the current through both the mouth and nose, yet obstruction in the nose alone would not lead to the same result, as it could not matter whether air enters through mouth or nose. But we have seen that in sleep, at all events, great inspiratory difficulty may arise from obstruction of the nose alone. Besides the thoracic deformity, some curvature of the spine is not unfrequently observed in young subjects affected with nasal obstruction, consisting in lordosis of the cervical spine and kyphosis of the dorsal region, and sometimes some lateral curvature. Interference with perfect aeration of blood may, no doubt, contribute to the anæmia, mal-nutrition, and even to the dulness of intellect, often observed in children and others, the subjects of nasal obstruction. A certain amount of dulness of intellect is undoubtedly present in connection with various forms of nasal obstruction. Inability to fix the attention, leading to inaptitude for mental work, the so-called *aproxia* of Guye, is frequently a characteristic feature; but whether, as Guye suggests, this is due to obstruction of the lymphatics of the nose, which communicate with those of dura mater, is at least doubtful.

Smell and Taste.—The sense of smell is interfered with, or abolished, by the obstruction to the current of air over the

olfactory region. Taste is also interfered with. Nevertheless, the olfactory region may be patent at the posterior nares, although there is obstruction in front, and thus the expiratory whiff, which takes place after swallowing, may reach the upper and back part of the nasal cavities, and enable flavours to be appreciated by the organ of smell. Thus taste may be sometimes almost normal, while smell is abolished. It is also to be remembered that the sense of smell may be abolished by obstruction of the upper part of the passages, say with mucous polypi, while there is a free passage through the lower parts of the nose.

Voice and Speech.—Alteration in the character of the voice is an invariable accompaniment of nasal obstruction. The alteration varies with the seat and extent of the obstruction. If the naso-pharynx is much obstructed, as with adenoid vegetations, the voice acquires a “dead” sound, and it will be impossible to pronounce the nasal sounds *m*, *n*, *ng*. Thus *man* becomes *bad*, *nose* becomes *dose* or *lose*, *song* becomes *sogg*, etc. When the obstruction in the naso-pharynx is less complete, the voice is wanting in resonance, has a flat character, and the nasal consonants are not distinctly pronounced. If the obstruction be in the anterior part of the nasal passage alone, the voice generally acquires a nasal twang. This twang varies much, but in general partakes of the character of what we call speaking through the nose. The nasal consonants can be pronounced, but the resonance is altered, and has a distant character.

Apart from these direct effects of obstruction of the nasal passages, chronic mouth-breathing also exercises an injurious influence on the muscles of articulation. Children so affected are slow in learning to speak, and often speak indistinctly. The pronunciation of some or of all consonants may be imperfect. Moreover, stammering has been proved to be of more frequent occurrence in chronic mouth-breathers.

Hearing.—Not the least important complications of nasal obstruction are deafness, tinnitus, and ear disease. Apart

from mechanical pressure on the orifices of the tubes by obstructing growths, and apart from the extension to the tubes of the almost ever-present catarrh, complete nasal obstruction acts injuriously in another way. When the nostrils are completely closed, each act of swallowing tends to exhaust air from the tympanic cavities, and to retract the tympanic membrane. Instead, therefore, of equalizing the atmospheric pressure within and without the tympanic cavity, each act of swallowing, when there is complete nasal obstruction, tends to retract abnormally the tympanic membrane, and in time this must lead to injurious consequences to the functions of the ear.

Treatment.—The necessity of removing severe nasal obstruction will be obvious from a consideration of the effects of obstruction above alluded to. Children are often found to improve in a remarkable manner, physically and mentally, after successful removal of nasal obstruction. Where the nasal stenosis is not severe, and nasal respiration only partially interfered with, it may be difficult to decide upon the advisability of operating. We shall then have to carefully consider whether any bad effects seem to have arisen, or are likely to arise, from the narrowing. The age of the patient, the probable cause of the obstruction, whether likely to increase or otherwise, will all have to be considered. The contact of parts within the nose, which should normally be separated, is also some indication, taken with other things, for interference.

The treatment will of course vary with the cause. The method of treating the more important of the causative conditions will be found in the various sections of this work. The treatment of membranous or bony occlusion of the posterior nares is attended with a good deal of difficulty. An opening can be made with the galvano-cautery, drill or chisel, but there is a great tendency for the opening to contract subsequently. Repeated passage of bougies has been employed to prevent this. Charters Symonds recommends, in order to make a good permanent opening, that the posterior margin of the septum be removed.

III. NASAL SUPPURATION.

A DISCHARGE of pus from the nose, whether originating in the nasal fossa, or the accessory sinuses, is a very common symptom. It occurs from various causes, and under various aspects, and the diagnosis of its origin may in some instances present one of the most difficult problems in rhinology. It will be advantageous to devote a section to some general remarks on the subject, to allude to the principal causes, and to lay down the general principles on which the diagnosis has to be made.

A purulent discharge from the nose may be unilateral, or it may be from both nasal passages. Again, it may take place partly or wholly into the naso-pharynx, instead of through the anterior nares. The discharge varies much in quantity and character in different cases. It may be rather copious. It may even drip from the nose when the head is held forward. On the other hand, it may be very scanty. It may be continuous or intermittent. The discharged matter may consist, not so much of liquid pus, as of more or less firm lumps or crusts. It may be free from odour, or it may be ill-smelling, or even excessively fetid. In certain cases, also, the odour is experienced chiefly by the patient, while in others it is perceived chiefly by those around.

Causation.—In reviewing the causes of purulent nasal discharge, it is convenient to divide the cases into those in which the suppuration is primary, and those in which it is secondary to other nasal diseases. The former class includes all those cases in which suppuration is the result of a more or less diffuse

inflammation of the mucous membrane of the nasal passages, or of the accessory sinuses; the latter includes those in which suppuration is a secondary result of some local disease, such as syphilitic or malignant ulceration, lupus, foreign bodies, etc.

The great majority of cases of primary suppuration, in the above sense, are cases of suppuration of the accessory sinuses, and this is especially true of chronic suppuration. Acute purulent rhinitis is not unfrequently observed in the course of certain infectious diseases, such as scarlet fever, measles, and diphtheria. In the course, or towards the end of an acute rhinitis, a purulent discharge may be observed for a certain time, though in some of these cases the discharge originates in the accessory sinuses. An acute purulent rhinitis has also been described as resulting from gonorrhœal infection. As regards chronic, long-standing cases of primary suppuration, the overwhelming majority are cases of suppuration of accessory sinuses; certainly in adults. In children a chronic purulent rhinitis is sometimes observed. The origin often dates back to an attack of scarlet fever or measles, but not always. Whatever the history, however, almost all the children have adenoid vegetations in the naso-pharynx. It may be observed, however, that in some of these cases, there is not, strictly speaking, a purulent rhinitis, as the pus in the nasal passages may proceed wholly from the region of the pharyngeal tonsil. The most familiar form of chronic purulent rhinitis is the disease known as chronic atrophic rhinitis or simple *ozæna*. It must be admitted, however, that many cases which up till quite recently were included under this designation, have been shown to be due to disease of the ethmoidal cells or other sinuses.

Among the secondary forms of nasal suppuration may be mentioned those associated with syphilis, lupus, and tuberculosis, malignant growths, foreign bodies, and rhinoliths.

Diagnosis.—The diagnosis can, as a rule, only be made by careful rhinoscopic examination. Certain symptoms and

features of the case may, however, help to guide one's opinion in this or that direction.

A unilateral purulent discharge in a young child would always suggest the likelihood of a foreign body in the nose. In an adult a similar condition would suggest a discharge from one or more of the accessory sinuses, especially if it were accompanied by intermittent pain in the same side of the head situated in the frontal, supraorbital, or occipital region. A complaint on the part of the patient of an unpleasant odour in the nose, or an unpleasant taste or smell from discharge passing back into the throat, is always suggestive of accessory sinus suppuration. On the other hand, an offensive smell from the breath, which is not perceived by the patient, and is accompanied by a discharge of offensive lumps from the nose, is suggestive of *ozæna*, especially if the patient is a young female. These and other points are useful indications in their way, but the diagnosis must be verified in all cases by rhinoscopic examination.

It is hardly necessary to say that we must satisfy ourselves that the discharge is really from the nasal fossæ, and not merely from a pustular or eczematous condition of the skin lining the vestibules. The two conditions may coexist, especially in children, for a discharge from the nose may irritate and infect the skin at the orifices. If the vestibules are carefully cleansed of crusts, it is easy to see if the pus is confined to this region. Supposing now that pus is present in the nasal fossa, it may be present on the floor, or covering various parts, but no conclusion can be drawn from its situation, as it may have found its way there from other situations. The parts must be carefully cleansed with pledgets of wool, or, if it seems desirable, the syringe may be used. There is very likely to be congestion of the mucous membrane which impedes the view, and the application of a ten per cent. solution of cocaine to the mucous membrane will cause this to subside. The passage can now be inspected, and the probe employed if necessary,

and, as a rule, there will be no difficulty in detecting any of the causes which produce a secondary suppuration, an ulcerated area, sequestrum, foreign body, etc., and in tracing the pus to this source. Sometimes, after cleansing and applying cocaine, it will be found that pus proceeds forward from the posterior choana, and further examination reveals its source to be some ulcerative or other disease in the naso-pharynx.

When, however, no cause can be found to which the suppuration is secondary, and we are forced to conclude that a primary suppuration of the mucous membrane of the nose, or, of the accessory sinuses exists, the difficulty of making an exact diagnosis is often very great. The general principle upon which we proceed, is to endeavour to observe where the pus first makes its appearance after the passage has been carefully cleansed. It may be possible, in certain cases, to decide that pus does not reappear in any one locality, but is secreted from the general surface. This is rare. The usual occurrence is this: After all trace of pus has been removed, the first sign of reappearance of pus is in the middle meatus, or in the olfactory slit, between the septum and the middle turbinal. If the first trace of pus appears in the middle meatus, we are led to conclude from this that either there is a circumscribed disease of the mucous membrane of the middle meatus, which is the source of the pus, or that there is a discharge of pus into the middle meatus from one of the accessory sinuses which opens into this region. These sinuses are the frontal sinus, the antrum, and the anterior group of ethmoidal cells. In like manner, when the first traces of pus reappear in the olfactory fissure, we have to deal either with a circumscribed disease of the mucous membrane in the region of the superior meatus, or with a discharge of pus from the sinuses opening in this region, viz. the posterior ethmoidal cells and the sphenoidal sinus.*

* It must be mentioned that although the division of the sinuses into these two groups, in respect to the position in which pus appears, represents the normal condition of things, the rule is not absolutely

It very often happens that, after all traces of pus have been removed, it quickly reappears, within, perhaps, a few minutes, in the middle meatus or olfactory fissure, and this may happen again and again. We may be certain, in this case, that we are dealing with pus which proceeds from a pre-formed collection in one of the sinuses, as it could not be secreted from the nasal mucous membrane in so short a time. On the other hand, if pus does not reappear immediately, nor, indeed, for hours, it is still quite possible that it proceeds from a sinus which is secreting pus in small quantity. In point of fact, until we have step by step excluded the presence of suppuration of the accessory sinuses, we are not in a position to assume with any certainty that the pus is secreted by the nasal mucous membrane.

The various steps by which the presence or absence of suppuration in the sinuses belonging to the two series, discharging respectively into the middle meatus and the olfactory fissure, will be indicated in the sections dealing with diseases of the accessory sinuses. Suffice it to say, that in many instances the diagnosis cannot be made at one sitting, and it may be only after repeated sittings that the pus can be traced to its true source.

invariable. For instance, the back part of the antrum may communicate with the upper meatus, and discharge its pus into the olfactory fissure, and a closed empyema of the anterior ethmoidal cells may make its way out between the septum and the middle turbinal.

IV. ACUTE RHINITIS (*Acute Coryza, Acute Nasal Catarrh*).

Causation and Nature.—Of all the mucous membranes that of the nose has the greatest tendency to catarrhal inflammation. Certain persons possess a peculiar liability to nasal catarrh. This liability seems to be sometimes due to a constitutional predisposition to catarrhal affections of mucous membranes. Children are more prone to the complaint than adults. Very often the predisposition to acute rhinitis is due to abnormal conditions of the nasal passages, such as deflections of the nasal septum, hypertrophic conditions, etc. In children the most frequent local predisposing cause is adenoid growths in the naso-pharynx; in adults, chronic hypertrophic rhinitis.

The commonest exciting cause is catching cold by exposure to draughts, getting wet, and the like. Catarrhal inflammation, commencing in the pharynx, not unfrequently extends to the nose, although the opposite course, viz. extension from the nose to the pharynx, is more frequent. The inhalation of certain irritating vapours and dust, such as those of chlorine, iodine, bichromate of potash, and arsenic, may excite attacks of rhinitis. The effects of the internal administration of iodide of potassium, in producing symptoms of acute rhinitis, are familiar. Rhinitis is often a symptom of certain infectious diseases, such as measles, influenza, scarlet fever, small-pox, diphtheria, etc.

Acute rhinitis sometimes occurs epidemically, under certain special conditions which are not understood. Its contagiousness has been asserted and denied by various authorities. Clinical

facts, such as its tendency to attack, successively, several members of a household, point to its being contagious, although it does not appear that any experimental inoculations have been successful hitherto. Bacteriological investigations have revealed streptococci, staphylococci, pneumococci, and other microorganisms, but it is doubtful whether any of them bear a causative relation to the disease. Cautley * found, in seven out of eight cases examined, more than one bacillus allied to the influenza bacillus, and he considers it extremely probable that a common cold is due to a type of organism closely allied to the influenza bacillus.

The inflammation in acute rhinitis may be confined to the nasal cavities, or may simultaneously involve the naso-pharynx. It sometimes involves the mucous membrane of the maxillary, frontal, and other sinuses. The lachrymal duct and conjunctiva, and the lining membrane of the Eustachian tube, may participate in the inflammation. At the onset the mucous membrane is red and dry. Small ecchymoses may be present in places. Swelling of the mucous membrane soon sets in. The venous network of the nasal membrane is peculiarly susceptible of rapid distension, especially over the lower turbinated bodies. A profuse serous exudation is secreted, alkaline in reaction, containing only traces of mucus. The secretion, after a time, becomes more mucous in character, and then muco-purulent, the swelling meantime subsiding. The histological changes are chiefly cellular infiltration of the mucous membrane and profuse wandering of leucocytes through the epithelial layer. The cilia are absent in places, as well as the superficial epithelial layer.

Symptoms.—In the idiopathic form, as distinguished from cases arising from such causes as irritating vapours, drugs, etc., there is generally a short period of malaise, lasting a few hours, or possibly a day or two, preceding the local symptoms. In severe cases there may be headache, chills,

* Local Government Board Report, 1894-95.

and elevation of temperature to 100° or 101°. A little pyrexia may continue until the second or third day of the attack.

The first local symptom is a sensation of dryness and irritation in the nose, and very soon the nose gets stuffy from swelling of the mucous membrane, and the patient experiences more or less fulness or throbbing pain in the forehead. Within a few hours, usually, from the onset of local symptoms, a watery discharge from the nose occurs. The occlusion of the nasal passages may now be complete, and the voice is correspondingly altered, and the senses of taste and smell are blunted. Respiration can only be carried on through the mouth. The mouth and throat become dry in consequence, especially in sleep. The lips are often dry and cracked. The gravitation of blood and serum may cause one or other nostril to be the more obstructed. Thus, in lying down in bed, the undermost nostril will generally be stopped. Attacks of sneezing are common in the dry stage, and at the onset of the watery discharge. The discharge, containing the saline constituents of the blood, irritates the skin about the orifices of the nostrils and the upper lip, and these parts soon become red and inflamed, from the irritation of the discharge, and the constant friction of the pocket-handkerchief. After a period, varying from a few hours to one or two days, the discharge becomes thicker and less irritating, and the smarting and fulness of the nose subside. The discharge gradually becomes muco-purulent, of a yellow or greenish colour, and scantier in quantity. The swelling of the mucous membrane has in the meanwhile gradually subsided, and the secretion, and any crusts that may form, are easily removed by blowing the nose.

If, as often happens, catarrhal inflammation extends to the neighbouring parts, the symptoms will be aggravated in various ways. The various sinuses may suffer from extension of the catarrh to their lining membrane, or perhaps the inflammation simultaneously affects the nose and sinuses, and these

complications may give rise to severe frontal pain, to general headache, or pain in the cheek and teeth, although, of course, such pains may occur in the course of acute rhinitis independently of affections of the sinuses. There is no doubt, however, but that acute rhinitis may be the starting-point of severe trouble in the accessory sinuses, and suppuration in the frontal, maxillary, and other sinuses, not unfrequently originates in this way. The mucous membrane of the pharyngeal vault is more or less inflamed, in most cases. This may give rise to sensations of dryness and burning in the throat, and to faucial irritation and hawking of phlegm. Singing in the ears, deafness, and earache or otorrhœa, result from extension of catarrh to the Eustachian tube. The buccal pharynx is rarely implicated to any extent. Extension to the conjunctiva, the larynx, or bronchi, causes the usual symptoms referable to those parts. The lymphatic glands beneath, and behind the sterno-mastoid, are sometimes swollen during an attack of nasal catarrh, and in certain individuals the swelling of the glands may outlast the catarrh.

On inspection, through the anterior nares, in the early stage, the mucous membrane appears red, somewhat dry and glazed, and swollen. The swelling soon becomes most marked on the inferior turbinated body, and it may be such as to block the inferior meatus, and completely obstruct the view of the nasal passage. The swollen tissues are seen bathed in watery secretion. Here and there may be seen small ecchymoses, or superficial erosions of the epithelium. At a still later stage the secretion is of a yellower colour and of a viscid character, and the mucous membrane, still red and inflamed, is somewhat less swollen than at first. Posterior rhinoscopy shows the choanæ more or less completely blocked by the swollen middle and lower turbinated bodies. The mucous membrane of the vault of the pharynx is usually reddened and swollen, and covered with yellowish and viscid secretion.

The duration of an attack of acute rhinitis ranges, usually

between four and nine days. On the other hand, many cases terminate abruptly on the second day, or even earlier, after a free watery discharge is established. This is the course usually followed by attacks due to local irritants. Acute rhinitis usually terminates in recovery, but it may pass into a subacute, or chronic form. It is, however, from a succession of acute attacks, rather than as a sequel to a single attack, that chronic rhinitis is apt to arise.

It is here important to remark that transitory attacks of sneezing, nasal obstruction, and watery discharge are peculiarly common in certain individuals, and though usually referred to as "colds in the head," are not strictly attacks of acute rhinitis. They are distinguished by their usually sudden onset, and equally sudden subsidence. The attacks have often a very short duration, a few hours or less. If of long duration, there are, usually, frequent remissions and exacerbations. There is an absence of constitutional symptoms, and of the definite stages, and gradual resolution of acute rhinitis. These attacks will be referred to more fully later on, under the name of *nervous* or *vasomotor coryza*.

Acute rhinitis in young infants may give rise to serious trouble. The meatuses are relatively smaller in infants, and the passages are therefore more readily obstructed. There will in consequence be inability to suck, owing to the necessity of breathing through the mouth. Great difficulty in breathing, and severe suffocative attacks, may arise during sleep, as the infant naturally tends to sleep with the mouth shut, or, even if the mouth be open, the tongue is apt to fall back in contact with the palate. It must be borne in mind that rhinitis in newly-born children, if at all persistent, is strongly suggestive of inherited syphilis.

Acute Purulent Rhinitis, in which the secretion is purulent almost from the commencement, is sometimes met with. It rarely occurs as a separate disease, but is more commonly an accompaniment, or sequel, of acute infectious

diseases, such as scarlet fever, diphtheria, or small-pox. The symptoms are, in the main, similar to those of ordinary acute rhinitis, except that the secretion is purulent, and may be fetid, and the disease is of longer duration. The conjunctiva and middle ear are often infected. A very severe purulent rhinitis is occasionally met with in the new-born infant, through infection from the vaginal secretion in delivery. In some cases this appears to be of a gonorrhœal nature. Adults have also been known to suffer from a gonorrhœal rhinitis from direct conveyance of infection by the finger or handkerchief. Although undoubted cases have been recorded, both in the infant and the adult, it must be admitted that gonorrhœal rhinitis is of extreme rarity, compared with gonorrhœal conjunctivitis, the nasal mucous membrane being, evidently, but very slightly susceptible of the infection.

Treatment.—Prophylactic treatment includes the avoidance of the known causes of the malady, the wearing of suitable clothing, and the equable distribution of the clothing over the body, the latter being a point often neglected, especially in children. A daily cold bath, if well borne, is held to be an effectual preventive against catching cold. Most important, also, is the removal of abnormal conditions of the nasal passages, which produce a liability to attacks of rhinitis, or render the attacks more obstinate. Among these conditions must be especially reckoned the various forms of nasal obstruction, such as adenoid vegetations, hypertrophic rhinitis, deflected septum, etc.

An attack of acute rhinitis may sometimes be arrested at the onset. Many remedies are vaunted for this abortive treatment. All of these fail at times, and in any case the success depends much on the promptness with which the remedy is applied. Five or six drops of laudanum, five to ten drops of spirits of camphor, five to fifteen grains of quinine, ten grains of iodide of potassium, are some of the remedies relied upon. Any one of these may be taken at

bedtime, the first night after the appearance of the symptoms, and its efficiency is insured by a hot mustard foot-bath, and a hot drink. Cohen claims to be able to arrest an attack by the administration of chloroform to complete anæsthesia, but this is obviously too dangerous a remedy.

Whether it is possible to completely arrest the attack at its onset or not, there is no doubt but that the severity and duration of an acute nasal catarrh can be much mitigated by treatment. The feverish condition at the onset is usually relieved by drop doses of tincture of aconite taken hourly. Free diaphoresis in the early stage is most useful. For this purpose a dose of Dover's powder (gr. v to x) may be administered at bedtime on the first night or two. This may with advantage be combined with the pulvis antimonialis of the pharmacopœia (gr. ii to v). Hot drinks, mustard foot-baths, and extra bedclothes will aid the effect. If this plan be adopted, the patient should generally be kept to the house, and a mixture, containing acetate of ammonia and spiritus ætheris nitrosi, may be administered during the day. The best effect will be produced if the patient can be kept in bed the first day or two.

Turkish baths constitute the favourite mode of diaphoresis with some, and they undoubtedly benefit a cold. A warm air-bath may be extemporized in the patient's own bedroom by burning a large spirit-lamp under the chair, on which the patient sits, enveloped in a blanket from the neck to the ground. Such a hot-air bath will set up copious perspiration, which continues after going into bed, and should be encouraged by free draughts of liquid. This treatment will sometimes completely arrest a cold in the early stage.

Sulphate of atropia, gr. $\frac{1}{120}$ to $\frac{1}{60}$, three times a day, is said to shorten and mitigate a cold in the head. If there is much smarting and burning in the eyes and nose, the administration, at frequent short intervals, of a very small dose of

arsenic, such as one-sixth of a minim of the liquor arsenicalis, every hour, will often give decided relief.

The inhalation through the nose of the vapours of ammonia and carbolic acid is useful for relieving the discomforts in the earlier stages, and is said to cut short the attack. The popular remedy, "Alkaram," is composed of these ingredients, and so is the German remedy of Hager and Brand (formula 26). Five or ten drops of the latter may be poured on to a funnel of blotting-paper, and inhaled every two hours. The inhalation of the vapour of iodine is recommended in the stuffy stage, but I have known this remedy to seriously aggravate the discomfort.

The application of a spray consisting of a four per cent. solution of hydrochlorate of cocaine, will generally relieve the obstruction of the earlier stages. Its effect is transitory, but in some cases the relief will last for five or six hours, and by repeating the application every four hours or so, constant relief may be maintained. Menthol has also been recommended, as having a somewhat similar effect to cocaine. It is best used as a spray dissolved in liquid paraffin (formulæ 16, 17). Snuffs containing cocaine, menthol, morphia, and bismuth in various combinations (formulæ 19, 20) have also been recommended, but they are less efficacious and agreeable than atomised solutions.

When the muco-purulent stage is rather marked and prolonged it may be desirable to spray or syringe out the nose with a tepid alkaline lotion once or twice a day (formulæ 1, 2). In the later stage of a cold, when the persistence of obstruction or other symptoms indicate a tendency to chronic catarrh, change of air, especially a change to the seaside, is often the best remedy.

In purulent rhinitis frequent cleansing of the nose is desirable. This is best done by means of a tepid alkaline lotion (formulæ 1, 2, 3, 6) applied with a syringe or spray-producer. As the severity abates, the cleansing will need to

be done less frequently, and may be followed by insufflation of boric acid or iodoform. In *infants* the cleansing is often most conveniently carried out with a camel's-hair brush or small roll of cotton-wool dipped in some alkaline lotion. If a syringe is employed, no great force must be exercised, and it is best to use a syringe with a sufficiently small nozzle to allow the fluid to flow back again. The air douche applied with the ordinary Politzer bag is sometimes useful to clear the nose. The secretions are forced out of the opposite nostril by the current of air. In some cases repeated application of vaseline or other simple ointment to the nasal orifices will be indicated.

V. MEMBRANOUS RHINITIS (Fibrinous or Croupous Rhinitis).

Causation and Nature.—Rhinitis, attended with the formation of a fibrinous membrane, is sometimes observed after operative interference, or the application of caustics, especially after the use of the galvano-cautery. The membrane may extend beyond the limits of the cauterized surface. Apart from these traumatic forms, however, an idiopathic membranous rhinitis is sometimes met with. These cases have been observed occurring sporadically, and principally in children. Though it is met with occasionally in adults, the disease runs a mild course, lasting usually from three to eight weeks, and may affect one or both nasal passages.

In this form of rhinitis, pseudo-membranes form upon the surface of the mucous membrane, of a whitish grey or yellowish colour, varying in thickness and density. The mucous membrane is inflamed and swollen, and on removal of the membrane the surface is red, and bleeds slightly. The condition of things is, indeed, identical with that found in diphtheria; but until recent years the affection was considered to be quite distinct from diphtheria, on account of the uniformly benign course which it runs. Within recent years, however, numerous observers have shown that diphtheria bacilli, in some instances of full virulence, in others of less virulence, or non-virulent, can be isolated from the membrane and secretions, in most cases of this type. Recently Lack * found diphtheria bacilli

* *Medico-Chirurgical Transactions*, vol. lxxii.

present in thirty-six consecutive cases examined by him, and holds that they are constantly present. Other observers have failed to find them in some cases, and I think the existence of a non-diphtheritic membranous rhinitis cannot at present be denied. Various micro-organisms (streptococci, staphylococci, pneumococci) have been described as the cause of the fibrinous inflammation in such cases. In spite of the bacteriological evidence of the identity of the majority of cases of membranous rhinitis with diphtheria, the clinical characters of these cases is very different from those of ordinary nasal diphtheria. The disease is infectious, and not unfrequently several members of a family are affected with membranous rhinitis, but it appears to have little tendency to produce ordinary diphtheria in others. It seems that in the majority of, or as some think, in all these cases of membranous rhinitis, we have to deal with a form of diphtheria characterized by a peculiar benignity. As to the cause of this benign character nothing is really known. Various theories have been propounded, but none of them is quite satisfactory.

Symptoms.—The symptoms bear a general resemblance, especially at an early stage, to those of an ordinary acute rhinitis. There is usually moderate fever at the onset, which passes off in a day or two. There is more or less obstruction of one or both nasal passages, and a rather copious sero-mucous discharge, which often causes redness, erosion, or eczema of the nasal orifices or upper lip. Later on the obstruction becomes complete, and the discharge becomes muco-purulent, and then purulent, but not fetid, or at most only very slightly so. Fragments of membrane may be discharged from time to time with the secretions. The disease may remain confined to one nasal passage throughout. There is no enlargement of glands, and except, perhaps, for a little malaise at the outset, there is a remarkable absence of general symptoms.

Unless a careful examination of the nose is made, the nature of the case is apt to remain unrecognized. On examination, a

whitish or yellowish-grey membrane is seen on the septum, inferior turbinal, or floor. Sometimes all these parts are covered, and the view of the interior of the nose is completely obstructed. Sometimes the membrane is of limited extent. It varies in thickness and consistency and in its adhesion to the mucous membrane. On detaching the membrane, the surface beneath will be found inflamed and slightly bleeding. After removal, the membrane forms again in twenty-four or forty-eight hours.

The duration of the attack varies from two or three weeks, to six or eight weeks, or even longer. The general health remains little if at all affected, and no paralytic sequelæ are observed. The disease shows no tendency to spread beyond the nasal fossæ, although occasionally small patches of membrane have been observed on the posterior pillars, the lateral bands, and posterior pharyngeal wall.

Treatment.—It is best to isolate all these cases at once. The treatment need not be very active, as the disease naturally tends to recovery. It is desirable to wash out the nose three or four times a day with a tepid disinfecting lotion (formula 6). Perchloride of iron may be administered internally.

VI. CHRONIC RHINITIS (**Chronic Nasal Catarrh**).

UNDER the term chronic rhinitis will be included long-continued hyperæmic and inflammatory conditions of the nasal mucous membrane; hyperplastic changes in the mucous membrane, chiefly affecting the inferior turbinated body; and certain inflammatory changes involving both the soft parts and the bony substance of the middle turbinated body.

Causation and Morbid Changes.—Chronic rhinitis may arise as a sequel to an acute attack. More often it results from repeated attacks. The infectious maladies, such as influenza, measles, scarlet fever, small-pox, etc., may be the starting-point of a chronic rhinitis. Chronic rhinitis may develop from any of the causes which produce acute attacks, and often enough it develops without recognizable cause. Prolonged inhalation of dusty atmosphere is said to be a common cause. Hence persons employed in certain occupations, such as weavers, millers, stonemasons, and workers in tobacco factories, are liable to suffer. Workers in arsenic and chrome factories are subject to a very troublesome form of chronic rhinitis.

Abnormalities in the nasal passages, such as deflections, or outgrowths from the septum, which obstruct the current of air, and impede the removal of secretions, strongly tend, more than any other cause, to the development of chronic rhinitis. Diseased conditions in the naso-pharynx, especially adenoid vegetations, are a common cause of the complaint. Adenoids act injuriously on the nasal passages, partly by hindering nasal

respiration, and partly by interfering with the easy return of venous blood from the nasal passages.

Chronic rhinitis may be secondary to various diseased conditions in the nose, such as new growths, destructive diseases, foreign bodies, and rhinoliths. It is an almost constant accompaniment, in greater or less degree, of chronic suppuration of the accessory sinuses of the nose.

It is generally acknowledged that heredity has much influence in producing a tendency to chronic rhinitis. Syphilis, inherited or acquired, undoubtedly predisposes to the complaint. Spirit-drinking and snuff-taking are also predisposing causes.

Two forms of chronic rhinitis are usually recognized, viz. simple chronic rhinitis, and hypertrophic rhinitis. No distinct line can, however, be drawn between the two, the hypertrophic condition being undoubtedly a later stage of the simple form. The tendency to the development of hypertrophic changes varies much in different cases, and the rate at which they progress varies much. Marked hypertrophic changes are not often seen before adult life.

In the earlier stage of chronic rhinitis, the condition of the mucous membrane is one of hyperæmia, with increased secretion. There is a generally-diffused swelling, the mucous membrane presenting a red and more or less uniform, soft, velvety surface. The swelling is usually most marked on the inferior turbinated body, owing to a constant distension of the erectile tissue. The erectile tissue on the inferior turbinated body may, indeed, undergo considerable enlargement, whether due to an actual hypertrophy, or simply to excessive dilatation of the venous spaces, is perhaps doubtful. This leads to the formation of large vascular swellings on the anterior or posterior ends of the inferior turbinated bodies, much larger than result from transitory swelling of the erectile tissue in its normal condition.

In course of time overgrowth of the tissues of the mucous

membrane takes place. The membrane may become thickened at various parts from an increase in all its normal constituents. In the earlier stages there is marked round-celled infiltration, with moderate increase of the connective tissue. At a later stage the connective tissue is largely developed, while the glandular elements are more or less diminished. The epithelial layer undergoes various changes. The ciliated layer is absent to a greater or less extent, and the columnar cells are replaced by cubical or squamous epithelial cells. The number of layers of cells is in places markedly increased. The hyperplastic process in the mucous membrane leads to changes which are usually most marked on the inferior turbinated body, especially at its anterior and posterior ends. Thus the anterior end of the inferior turbinated body may form a large rounded tumour, sometimes smooth, more often uneven, lobulated, or divided into leaf-like segments. Sometimes pedunculated papilloma-like excrescences are developed on the anterior end, or along the lower border of the turbinal. The whole extent of the inferior turbinated may be enlarged, presenting an uneven, wavy, or finely lobulated surface, and a firm consistence due to the increase of connective tissue. The posterior end of the inferior turbinated may form a large rounded tumour with an uneven or mammillated surface, and large enough to completely obstruct the lower half of the choana.

The middle turbinated is often the seat of inflammatory changes. It may be affected simultaneously with the inferior turbinal, or independently. The mucous membrane may be simply red and slightly swollen, or there may be marked hyperplastic thickening. A considerable fold of mucous membrane may hang down from the lower border of the body. In places the mucous membrane may be very thick, and present an cedematous or gelatinous appearance. The inflammatory process may extend to the periosteum and bone, or the bone may undergo enlargement (hyperplastic osteitis) in a uniform or irregular manner. Similar inflammatory changes may affect

the structures in the middle meatus, the mucous membrane in and about hiatus similunaris, the uncinata process, and the ethmoidal bulla. These marked inflammatory changes in the region of the middle turbinal and middle meatus are very often secondary to chronic suppuration of the accessory sinuses. They are frequently attended with the growth of mucous polypi in the region.

The mucous membrane of the septum often presents circumscribed or diffuse thickenings, the most frequent site being the lower part. Many cases of hypertrophic rhinitis are associated with marked septal deviation. In such cases it will often happen that the more capacious passage becomes gradually narrowed by overgrowth of the tissues of the middle and inferior turbinated bodies.

It is often stated that atrophic rhinitis is the final stage of chronic hypertrophic rhinitis. It is true that in course of time the hypertrophied mucous membrane in chronic rhinitis sometimes undergoes a certain amount of shrinking, due to contraction of the newly-formed connective tissue. In this process the glandular elements become involved and partially destroyed. Dryness of the mucous membrane ensues, and some tendency to crust-formation. I do not, however, believe the disease known as atrophic rhinitis, or simple ozæna, is to be regarded as the final stage of hypertrophic rhinitis, or that there is any sufficient proof that true atrophic rhinitis is necessarily or usually preceded by a hypertrophic stage.

Symptoms and Course.—Alteration in the quantity and quality of the secretion of the nose is the most constant accompaniment of chronic rhinitis. In health, the mucous membrane of the nose secretes chiefly a watery fluid, which goes to saturate the air as it is inspired. Only a very moderate amount of mucus is discharged from the anterior or posterior nares. In chronic rhinitis the amount of secretion varies in quantity and quality in different cases, and in the same case at different times. It is discharged chiefly from the anterior

nares into the pocket-handkerchief, and partly into the nasopharynx. It is sometimes thin and watery, sometimes it is a thick tenacious mucus, or this may alternate with the more watery discharge. It may be muco-purulent, or even purulent. Chronic purulent rhinitis is mostly observed in children, especially as a sequel of one of the acute infectious maladies. It is not uncommon also as a complication of adenoid vegetations in children. A simple chronic purulent catarrh, affecting the general surface of the mucous membrane of the nose, is very rare in adults, and indeed in all cases the diagnosis should only be made after excluding all localized foci of suppuration. Among the latter must especially be mentioned purulent catarrh of one or more of the accessory sinuses.

The nasal secretions are often discharged in greater or less quantity into the naso-pharynx, leading to discomforts in the throat and efforts to clear it by hawking and spitting. Sometimes the secretion dries and forms crusts on the fore part of the turbinated bodies and septum. The fore part of the septum is sometimes the seat of a troublesome chronic process, attended with the formation of a dry varnish-like coating, or thin crust (rhinitis sicca anterior). The presence of a crust in this situation often gives rise to a habit of picking the nose, and abrasion or ulceration of the surface at this point may result. Hæmorrhage often occurs from picking off the scabs from the ulcers, and perforation of the septum may take place from extension of the ulcerative process.

In simple chronic rhinitis without hypertrophy there will be a more or less constant feeling of stuffiness, but no marked persistent nasal obstruction. Temporary obstruction, however, frequently occurs from distension of the cavernous tissue, and in lying down it will often be noticed that the undermost nostril is obstructed. In proportion to the amount of hyperplastic thickening, nasal obstruction becomes a more marked and constant symptom. Alteration in the voice, mouth-breathing, and various troubles dependent on nasal obstruction, arise.

The sense of smell is impaired, and to some extent the sense of taste. The functions of the Eustachian tube are interfered with, and deafness, ringing in the ears, and perhaps inflammation of the middle ear, may occur. The tear duct is sometimes obstructed. Dryness of the throat is often complained of, especially after sleep. The lower pharynx and larynx are liable to inflammatory troubles, from extension of the catarrhal process, and from the pernicious effects of mouth-breathing. The patients often complain of frontal headache, a feeling of pressure in the head, inaptitude for work, and loss of memory. A sensation of pain or weight across the bridge of the nose is sometimes complained of, and this symptom is especially found associated with enlargement of the middle turbinated body, on one or both sides.

The swelling of the mucous membrane being liable to variations, the amount of obstruction varies at different times, and it is liable to be increased in damp weather. Very slight turgescence, also, of the erectile tissue will complete the obstruction in the already narrowed passage, and the swollen body, pressing on the septum, causes irritation, and keeps up the tendency to swelling. It must be remembered, also, that the subjects of chronic rhinitis are very liable to acute, or subacute attacks, in which most of their symptoms will be intensified.

Redness of the tip of the nose, often of a transient, recurrent character, may sometimes be noticed in connection with chronic nasal catarrh. A dry, eczematous, or cracked condition of the skin near the anterior nares is not uncommon. Sometimes the integuments of the alæ and tip of the nose become permanently swollen and thickened.

In addition to the symptoms already enumerated, many conditions referred to in the section on "Reflex Nasal Neuroses," such as paroxysmal sneezing, spasmodic cough, asthma, etc., may occur in association with chronic rhinitis.

On examination with the nasal speculum, in simple chronic

rhinitis before hypertrophic changes have taken place, the mucous membrane will be found diffusely, but slightly, swollen, reddened, soft and velvety, and flecked here and there with secretion. A collection of secretion is sometimes found on the floor of the fossa. The anterior end of the inferior turbinated body may be so swollen as to be in contact with the septum. This swelling, which is smooth and uniform, of a red or pale grey colour, can be proved to be due to simple turgescence of the vessels by its easy indentation with the probe, and its subsidence under cocaine. In some cases of chronic rhinitis, especially where there is a free watery discharge, the surface of the mucous membrane is somewhat pale throughout.

If the hypertrophic process has advanced to any extent on the inferior turbinated body, the surface of the body will generally present an irregular wavy appearance, and it is with difficulty indented with the probe. In marked cases the anterior end of the inferior turbinated body will completely block the inferior meatus, coming in contact with the floor of the passage and the septum. The surface of this swelling is usually of a red or greyish-red colour, and is often uneven, raspberry-like, or it may present a deeply-segmented cauliflower appearance. Sometimes pedunculated outgrowths are attached to it. The probe may be needed to make out the nature of the attachments of the hypertrophied mass which, by the inexperienced, may be mistaken for a mucous polypus. If the anterior end be not too much enlarged to permit a view, the middle and hinder portions of the inferior turbinated body may be seen thickened, uneven, lobulated, or presenting papillomatous outgrowths, the inner surface approaching or touching the septum, and the inferior border projecting down and resting on the floor of the nose. By passing a probe under the turbinated body, the hyperplastic outgrowths which hang downwards can be pushed out and made more evident. If the posterior part of the inferior turbinated body be the principal seat of enlargement, the hypertrophy can usually be made out from the

front, and palpated with the probe, especially after the application of cocaine to the anterior parts, but it will be better seen by posterior rhinoscopy in most cases.

The middle turbinated body will often be seen swollen at its anterior and lower part. The colour will usually be redder than natural. Fleshy processes of hypertrophied tissue are not uncommonly seen projecting from its anterior and inferior border, freely movable with a probe. In some cases the middle turbinated body may form a large swelling, occupying the whole space between the septum and the external wall, projecting down to the inferior turbinated body, and thus completely occluding the middle meatus and olfactory fissure. The surface of the swollen body may be smooth, or may present one or more rounded elevations of a redder colour than the rest of the body. Sometimes the surface, for a greater or less extent, may present the appearance of a mass of granulation tissue, or the concavity of the middle turbinated body may be more or less filled with granulations. Gelatinous processes of mucous membrane, or definite mucous polypi, are often present in these cases. Occasionally there is an appearance of a vertical cleft in the anterior aspect of the middle turbinated body. Woakes, who first called attention to this appearance, considered it to be the result of a cleavage of the middle turbinated body; but, as William Hill and others have pointed out, the mass on the outer side of the cleft in such cases is not really a portion of the middle turbinated body. The outer mass is formed by hypertrophy of the uncinatè process of the ethmoid (see page 9), the hypertrophy involving the bone and mucous covering, or merely the mucous covering of the process.

The tissues of the septum may be seen to be more or less thickened, very often markedly so, near the floor, opposite the anterior end of the inferior turbinated body. Irregular elevations of the mucous membrane on the anterior part of the floor of the nose are not uncommon. Deflections of the septum, or

projecting spurs or ridges, are frequently associated with chronic rhinitis.

The surface of the mucous membrane is generally moist, and more or less mucous or muco-purulent secretion is present. In some cases, especially those of long standing, the parts may have a more or less dry appearance, and a dried film of mucus, or dry adherent flakes or crusts, are seen on the surface, more especially on the fore part of the middle turbinated body. In those cases in which there are marked changes in the middle turbinal, or granulation-like masses blocking the middle meatus, pus is often present in greater or less quantity, since these marked changes are usually secondary to suppurative disease in the accessory sinuses.

With the rhinoscopic mirror, the posterior end of the middle or inferior turbinated bodies, especially the latter, may be seen to be enlarged. The posterior ends of the inferior turbinated bodies sometimes form large rounded tumours, blocking up the lower half or two-thirds of the choanæ. These tumours are generally of a pale colour, but sometimes they are dark red or purplish. They often present an uneven, nodulated, or mulberry-like surface, the so-called mulberry or moriform growths. They may project into the naso-pharynx, and if present on both sides, may meet each other in the middle line, so as to hide the lower part of the septum. Sometimes these swellings are largely composed of erectile tissue, and will then vary in size at different times, and diminish on the application of cocaine.

The mucous membrane of the vault of the pharynx may often be seen congested, and there may be swelling of the pharyngeal tonsil, especially in young subjects. Tenacious muco-purulent secretion may be present on the walls of the naso-pharynx, and often some secretion will be noticed flowing from the posterior nares. The posterior wall of the naso-pharynx and pharynx may present a dry appearance, being coated over with a film of dried mucus. This appearance

sometimes coincides with the dry condition of the nasal mucous membrane, already referred to.

Hypertrophic rhinitis is generally bilateral, but by no means always equally marked on the two sides. The course of the complaint is always very chronic. It may continue at any one stage of development for an indefinite term. The more advanced degrees of hypertrophy probably take a long time, perhaps years, to develop; and hence these advanced cases are not often met with in children. If the disease has existed for a long time, and the hyperplastic changes are far advanced, it shows little tendency to spontaneous cure. However, in course of years, contraction undoubtedly takes place in the hypertrophied mucous membrane, as is evidenced by the fact that the pronounced forms of hypertrophic rhinitis are rarely seen in advanced life.

Treatment.—The treatment of chronic rhinitis will depend on the nature of the case, especially on whether marked hyperplasia of the mucous membrane is present or not. As a general rule, persons affected with chronic rhinitis must avoid all influences tending to aggravate the malady; especially must they avoid catching cold, as each acute attack aggravates the chronic condition. Dusty atmosphere, and rooms or railway-carriages laden with tobacco smoke, must be avoided. Snuff-taking should be prohibited, and alcohol taken but sparingly. Violent blowing of the nose should be avoided, as well as the habit of constantly endeavouring to overcome the obstruction by forcible sniffing. A dry, pure, moderately warm atmosphere is the most favourable for relieving the discomforts of chronic rhinitis. Constitutional treatment with cod-liver oil, iron, sea air, etc., will be found very beneficial in delicate and strumous children affected with chronic rhinitis.

The treatment of chronic rhinitis is almost entirely local. At the outset, we must satisfy ourselves that there is no diseased condition present, such as a foreign body, or nasal polypi, to which the nasal catarrh is merely secondary.

Adenoid vegetations in the naso-pharynx are a very common cause of chronic nasal catarrh in children, and if the vegetations are at all extensive little improvement may be possible until they have been removed. Septal deviations and out-growths which interfere with the patency of the passages, or impinge upon the turbinated bodies, are often a cause, or an aggravating condition of the disease, and their correction may form an essential part of the treatment in some cases.

Cleansing the nasal passages of the secretions is useful in most forms of chronic rhinitis, and in simple cases, especially if of recent origin, the systematic cleansing of the passages once or twice a day with a warm alkaline lotion produces marked improvement or complete cure. For this purpose a tepid lotion, such as formulæ 1, 2, 3, may be used with a spray apparatus, a syringe, or the nasal douche used with the precautions mentioned at page 75.

In many cases, especially in those in which hypertrophic changes are absent or little advanced, benefit will be obtained by using, three or four times daily, a liquid paraffin * spray, containing a little menthol or menthol and camphor in solution (formulæ 16, 17). Where there is obstruction from vascular turgescence menthol tends to free the passage. A menthol-camphor spray may often be employed with advantage simultaneously with daily use of a warm alkaline lotion. The preceding treatment, coupled with avoidance of all aggravating influences, and general hygienic treatment on the lines already indicated, will often be found sufficient in the less advanced forms of chronic rhinitis. I have quite given up the use of astringent sprays and powders, as I have never seen any good result from them. Neither have I from nitrate of silver, which has been much recommended in some quarters.

When there is persistent vascular swelling of the inferior turbinated body, and still more when there is advanced hyper-

* Liquid paraffin is sold under various names, such as paroleine, glymol, albolene, chrismaline, liquid vaseline, etc.

plasia, some method of destroying the tissue, so as to restore the free patency of the passages, will have to be had recourse to. Chromic acid, nitric acid, and trichloroacetic acid are used for the purpose, but chromic acid is the best. A probe, slightly flattened at one end, serves very well for applying chromic acid. I always apply the pure acid, carrying a crystal or two of the deliquescent acid adhering to the end of the probe to the exact spot to be acted on. It is not well to do too large a surface at one sitting. The application is sometimes, though by no means always, somewhat painful; but painting the part with a solution of cocaine before applying this, or other destructive agent, considerably lessens the pain. After the application it is well to wash the parts with an alkaline lotion. Chromic acid is fairly effectual for reducing the cavernous swellings on the inferior turbinated body. Bosworth thinks the formation of a thin slough over the cavernous tissue, when it is constricted by the previous application of cocaine, acts by buttoning down the tissues for a time, and so allowing the walls of the vessels to regain their normal tone.

We have in the galvano-cautery, however, the most active means of reducing the redundant tissue by cauterization. Its use is generally less painful than chemical caustics. Occasionally, however, it is followed by rather violent inflammatory reaction, and it is therefore well to be cautious about using it too freely at any one sitting. It is also a good rule not to apply it to both nasal passages at the same sitting. In treating the swelling on the anterior ends of the inferior turbinated bodies, the edge of the flat, spatula-like point, at a red heat, may be drawn from behind forward across the swelling, so as to score it deeply. Two or more such furrows may be made, one below the other. Good results are obtained on the cavernous tissue by sticking a pointed cautery deeply into the tissue, at several points, or by inserting it at one point, and moving it about freely in the deeper parts, while at a red heat. For this latter method it is claimed, as

an advantage, that there is less destruction of the epithelial and glandular structures at the surface.

When the hypertrophy is very marked, and especially when it tends to form projecting, freely movable polypoid, or cauliflower-like masses, removal with the cold or the electric cauterity snare is the best treatment. The electric cauterity snare is preferred by many, as producing less hæmorrhage than the cold snare. It also has the occasional advantage, that by heating the loop, as soon as it is in contact with the surface, it tends to adhere, and we can thus engage portions of tissue

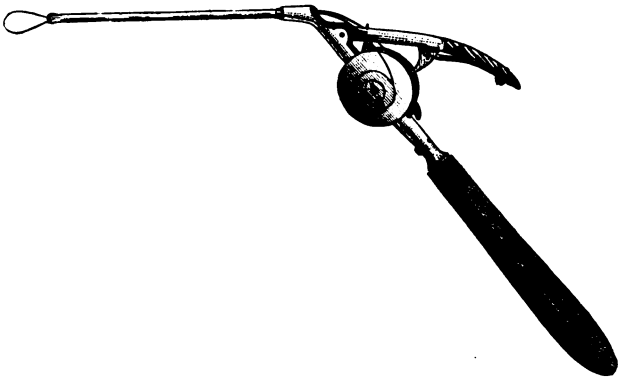


FIG. 35.—Mackenzie's Wire Écraseur.

which could only be seized with the cold loop by previously transfixing with a needle. I almost always employ the cold wire loop in the removal of hypertrophied tissues, and the instrument which I have found most useful is Mackenzie's wire *écraseur* (Fig. 35), threaded with No. 4 or 5 piano wire. This instrument is powerful enough to cut through easily any mass of soft tissue that may be engaged, and it can also, when required, be made to cut through small portions of the middle and inferior turbinated bones.

The enlargements and mulberry-like growths on the

posterior ends of the inferior turbinated bodies are the most difficult to treat, on account of their position. The application of the galvano-cautery point, which may be made through the

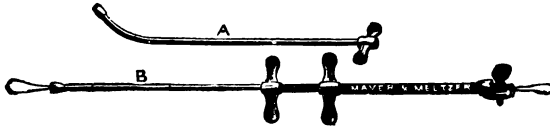


FIG. 36.—Jarvis's Wire Snare-écraseur.

anterior nares, or with the rhinoscopic mirror through the naso-pharynx, is not usually sufficient, and, moreover, owing to the proximity of the Eustachian tube, it is safer not to apply the cautery to these parts. Posterior hypertrophies can generally be engaged in the loop of a snare-écraseur introduced through the anterior nares. Mackenzie's or Jarvis's wire *écraseur* (Fig. 36) may be used for the purpose. Jarvis's wire *écraseur* is a light and handy instrument, and is more powerful than Mackenzie's. A tube, slightly curved at the extremity, can be used instead of the straight tube, and this affords greater

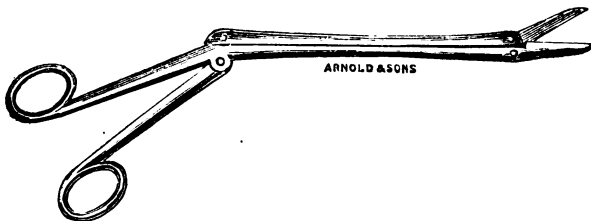


FIG. 37.—Walsham's Nasal Scissors.

facility for adjusting the loop in posterior hypertrophies. The loop can be tightened very slowly, in removing large vascular portions of hypertrophied tissue, in order to ensure freedom from hæmorrhage.

The obstruction caused by hypertrophy of the inferior turbinated body can only be remedied, in some cases, especially in a narrow nasal passage, by partial or complete removal of

the bone. Partial removal can be performed, according to the circumstances of the case, by means of a galvano-cautery loop, Mackenzie's or Jarvis's wire *écraseur*, Woakes's or Grünwald's forceps (Fig. 39), or Walsham's nasal scissors. Carmalt Jones devised a form of ring-knife (Fig. 38) for removal of the enlarged inferior turbinated body, which is, of all instruments for this purpose, the most effective, rapid, and easy to use. The

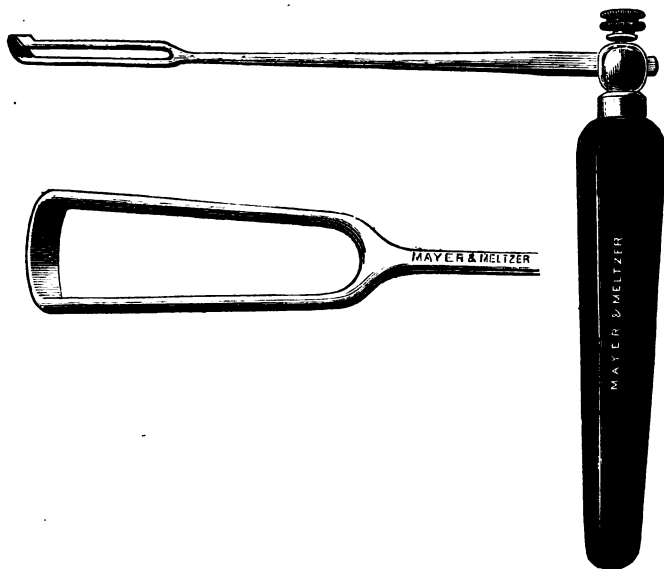


FIG. 38.—Carmalt Jones's Turbinotome.

instrument is passed backwards through the nostril, the convex surface of the blade being turned towards the turbinal, and with the help of the index finger in the naso-pharynx the posterior end of the inferior turbinal is engaged in the ring. A quick steady pull forwards will completely remove the turbinal, which may come away with the instrument, or be ejected or removed afterwards with a pair of forceps. By engaging the posterior end more or less completely in the instrument, and by

drawing the handle of the instrument more or less towards the middle line, it is possible to remove a greater or smaller



FIG. 39.—Grünwald's Cutting Forceps.

portion of the body, or to remove only the posterior portion and leave the anterior part intact. The bleeding is generally

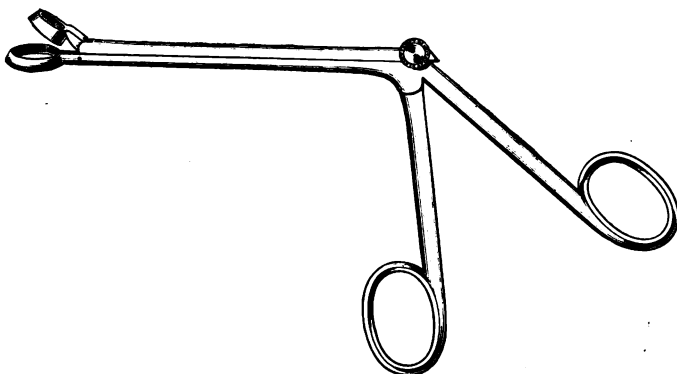


FIG. 40.—Hartmann's Conchotome.

profuse at first, but is easily controlled by plugging the passage with iodoform gauze. In this and many other operations on

the nasal passages, I find it very convenient to have at hand an epistaxis air-plug (Fig. 47). This can be inserted for a few minutes, and on its removal it will often be found that the hæmorrhage has ceased sufficiently to dispense with further plugging. By previously dipping the air plug in a solution of suprarenal extract, which has marked hæmostatic properties, the hæmorrhage is still further lessened.

Enlargements of the middle turbinated body may require to be treated either because of nasal obstruction, or on account



FIG. 41.—Removal of anterior part of middle turbinal; a, superior turbinal; b, middle turbinal; c, inferior turbinal; d, e, position of loop of snare.

of neuralgic pains due to the pressure of the swollen middle turbinated body on the septum. In some cases the treatment may be required in order to prevent obstruction of the orifices of diseased sinuses and allow a free outflow for pus. Hypertrophic fleshy prominences may be treated with chromic acid, the galvano-cautery, or the hot or cold snare. Portions of the enlarged middle turbinated bone can be removed with cutting

forceps (Figs. 39, 40), or the hot or cold snare, according to circumstances. A convenient method of amputating the anterior part of the middle turbinal, is to divide the bone close up to its attachment to the outer wall, with a cutting forceps, and then to pass the loop of the snare round the anterior part, as shown in Fig. 41. Lake recommends a similar procedure for removing the anterior part of the inferior turbinal.

Cocaine is very useful in relieving the pain of most of these intra-nasal operations. For the more severe procedures, such as the removal of the whole or portions of the turbinated bodies, a general anæsthetic may be required. Nitrous oxide gas will usually suffice. The after-treatment varies with the extent and severity of the operation. After a moderate application of the galvano-cautery, or the removal of small portions of hypertrophied tissue with the snare, the patient can usually continue his ordinary occupation; but when larger operations have been performed, confinement to the house for two or three days may be desirable, and the wounds should be kept clean with antiseptic lotions and insufflation of iodoform, iodol, or boric acid.

VII. FETID ATROPHIC RHINITIS (Simple Ozæna).

Causation and Morbid Changes.—The disease known as fetid atrophic rhinitis is a chronic affection of the nasal fossa, characterized by a progressive atrophy of all the elements of the mucous membrane, and to a variable extent of the subjacent bone also, and by an altered state of the secretion, of such a nature that it assumes a purulent character, and tends to rapid fetid decomposition, and the formation of crusts. From the peculiar and characteristic fetor of the secretions, the name *ozæna*, or *simple ozæna*, is also applied to the disease. It must be admitted that a considerable number of cases which, a few years ago, were regarded as instances of this disease have been shown to be really cases of chronic suppuration of one or more of the accessory sinuses, especially of the ethmoidal cells, and, on this account, some have gone so far as to question the existence of *ozæna*, as a disease *sui generis*, and to refer all cases of *ozæna* to suppuration of the accessory sinuses. This view, however, cannot, in my opinion, be sustained. There exists, undoubtedly, a genuine *ozæna*, quite independent of disease of the accessory sinuses.

The condition is probably always developed slowly, the process often extending over years; but the rate of progress differs undoubtedly very much in different cases. It commences usually in childhood, somewhere between seven and nine years of age, or from that to the age of puberty. It has been occasionally observed in quite young children, of four or five years of age, or even less. It very rarely commences in adult life. On the other hand, the disease, in a troublesome

form, is not much met with in advanced life, as the secretions tend to diminish and to lose their fetidity after forty-five or so. It is more common in females than in males, in the proportion of about three to one. Heredity has undoubtedly some influence in its production. Instances are occasionally met with of two or three brothers and sisters of a family being affected, or of a parent and one or more children. As far as is known, the disease is not contagious.

It is doubtful whether syphilis, inherited or acquired, and scrofula, are more than occasional predisposing causes. The subjects of the malady are, however, as a rule, not in robust health. They are often markedly anæmic. De Havilland Hall maintains that anæmia is an important etiological factor, and that the frequency of gastric ulcer, in the same kind of patients, points to a special vulnerability of the mucous membranes in anæmia. Atrophic rhinitis is said to develop sometimes as a sequel of acute illnesses, such as diphtheria, measles, small-pox, etc.

Zaufal holds that the diminutive size of the spongy bones is due to an arrest of development. The abnormal width of the cavities, resulting therefrom, conduces to retention of the secretions, which easily become dry and decompose. Hopmann has recently advocated somewhat similar views. He finds that the septum in simple ozæna is, as a rule, markedly shorter, in the antero-posterior direction, than normal. He regards the shortness of the septum, the diminutive size of the turbinals, and the abnormal width of the fossæ as results of arrested development. A too free entrance of air and irritants, combined with some inherent weakness or want of resisting power in the mucous membrane, conduces to the development of ozæna. There is, I think, no doubt that abnormal patency of the nasal fossæ predisposes to the disease, but that it is no more than a predisposing cause is evident from the fact that ozæna sometimes occurs in passages of normal or less than normal capacity.

The cause of the peculiar fetor is a matter of much interest, as an elucidation of this might be expected to throw some light on the essential cause of the disease. The fetor undoubtedly resides in the secretions, and is presumably owing to their decomposition. Krause, B. Fränkel, and others are of opinion that the fatty globules in the degenerated glandular epithelium undergo rapid decomposition into fatty acids, which impart to the secretion its peculiar odour as it is discharged from the glands.

Numerous bacteriological researches have been undertaken with a view of discovering, if possible, a micro-organism peculiar to the disease. Lœwenberg, in 1884, discovered an organism which he believed to be characteristic of ozæna. He described it as occurring as a capsuled diplococcus, spheroidal, or ellipsoidal in form. Other observers have confirmed Lœwenberg's observations in the main, as to the constant presence of a capsuled bacillus (*bacillus mucosus ozænæ*) peculiar to this disease. It cannot yet be considered as absolutely proved that this micro-organism is the cause either of the disease or of the peculiar fetor, although it is probable that it is largely concerned in the production of the latter. The pseudo-diphtheria bacillus is found very frequently, though not constantly, in the secretions of ozæna. Although much importance has been attached, in some quarters, to the presence of this bacillus, it is most probable that it plays no part in the production of the disease or of any of its symptoms. On the whole, I am of opinion that it will ultimately be shown that the disease is from the beginning a specific inflammation excited by a special micro-organism, although local conditions, such as abnormal patency of the passages, or some inherent (congenital) malnutrition of the mucous membrane or turbinal bones may play a considerable part in determining the onset of the disease.

In an advanced case of atrophic rhinitis, the mucous membrane is thin, wasted, and dry. The glands and erectile tissue have more or less completely disappeared, and the turbinated

bones, especially the inferior, are of diminutive size. In some cases the inferior turbinated body is represented merely by a thin fold of mucous membrane on the outer wall. The mucous membrane of the naso-pharynx is also almost invariably atrophied, and the adenoid tissue in the vault has almost quite disappeared. In less advanced cases the atrophy is less marked, and may affect only one nasal fossa, or even a portion of one fossa.

There is little doubt that the progressive atrophy is due to an inflammatory process. It is held by many that the atrophic condition is preceded by a hypertrophic stage, and, in fact, that atrophic rhinitis is the final stage of chronic rhinitis. This view, however, depends rather on theoretical considerations than on actual clinical experience. It may be true that atrophic rhinitis is sometimes preceded by a hypertrophic state, but there is not the least proof that this is the necessary or even the usual sequence. The early age at which the disease is often established is against the supposition that hypertrophy is usually an antecedent condition. We are, indeed, very much in the dark as to the condition of the mucous membrane at the onset of the disease. Our attention is not called to the case until the fetor has existed for some time. At this period it is certainly rare to find any trace of hypertrophy in the nasal mucous membrane; in fact, the atrophic process in the majority of cases is found already far advanced. I have no doubt, however, from the history obtained in some cases, that a simple purulent rhinitis preceded the atrophic and fetid stage for a more or less prolonged period.

From the histological researches of Häbermann and others, it would appear that the epithelium of the glandular structures undergoes fatty degeneration at the onset of the disease. These glandular changes are the earliest and most constant characteristic of the disease. The mucous membrane shows more or less marked round-celled infiltration, the cells often exhibiting fatty degeneration. The glands undergo atrophy,

and become materially reduced in number, or altogether disappear, as the disease advances. The blood-vessels and cavernous structures are in great part destroyed, and disappear. The lumen of the arteries which remain is reduced through thickening of the arterial coats. The columnar ciliated epithelium is replaced to a greater or less extent by squamous epithelium, which in places exhibits a horny condition. The mucous membrane undergoes fibrous sclerosis, and is transformed in parts or throughout its whole extent into a thin fibrous layer. The turbinated bones are reduced in size, the calcareous substance being gradually absorbed. Almost all trace of the lower turbinal bone may disappear, but the middle turbinal is less frequently atrophied to such an extreme degree. The atrophy of the bone is not altogether secondary to the atrophy of the mucous membrane and its blood-vessels, as recent histological researches seem to show that the bony resorption is a very early phenomenon in the morbid process. Fibrous transformation of the mucous membrane of the naso-pharynx may also take place, accompanied by disappearance of the adenoid follicles of that region.

From an early period in the disease the secretion is purulent, tenacious, and tends to accumulate in the nasal passages. In later stages it becomes more viscid, and dries rapidly into crusts. The secretion under the firm crusts, being imprisoned, causes irritation and further pus secretion. It is probable that the firm adherent crusts constrict the circulation, and favour further atrophy of the mucous membrane and spongy bones.

Symptoms.—The symptoms may be very slight, or well marked, and in any case they will have supervened gradually and slowly, and, at the time the patient comes for treatment, they will generally date back for some years.

In a marked case the patient has from time to time a feeling of something lodged in the nose, and when the nose is blown a lump of dried secretion is discharged. This may occur at intervals of a day or two, or longer, and the lumps vary in

size, are of a greyish-green or brown colour, and smell offensively. Similar lumps are in some cases hawked up from the naso-pharynx. Besides these lumps, more or less inspissated muco-pus of a fetid character may be discharged from the nose. Attacks of epistaxis are not uncommon, resulting from the mechanical irritation or forcible removal of the crusts. There are apt to be pain and irritability of the nose, and a constant desire to pick at it. Dryness and discomfort are complained of at the back of the nose and in the throat. Hawking efforts, and even retching, may be caused, especially in the morning, by the attempts to dislodge secretions or crusts from the naso-pharynx. The crust accumulation in the nose may be sufficient to cause some obstruction, but more often there is a feeling of stoppage, without any actual obstruction. Dull headache, pressure over the eyes, and incapacity for mental work may be present, as in many other nasal affections. The sense of smell is interfered with in all cases, and is very often quite abolished. Hearing is often impaired, and tinnitus complained of. Hoarseness of voice is not an unfrequent occurrence. Subjects of ozæna are peculiarly exempt from ordinary attacks of acute rhinitis.

The most characteristic symptom of the disease is the peculiar, sickly, offensive odour from the breath, arising from the nasal secretions. It is unlike that of other nasal diseases, and, as a rule, is easily distinguishable. The patients themselves very rarely perceive the odour; they, usually, are first made aware of it by those around them. For this symptom they often enough first present themselves for treatment, frequently attributing it to their stomach or teeth. The odour is usually more marked in the morning, and as a general rule it is proportionately strong according to the amount of retained crusts and secretions. It is not uncommon for these patients to suffer from more or less gastric catarrh, which may well be attributed to swallowing decomposing crusts from time to time. The prolonged inhalation of fetid air can, also, be easily believed to have an injurious effect on the general nutrition, and it is a

question whether the anæmia, and mal-nutrition, which are so often present in these patients, are not a result, rather than a determining cause, of the disease. Some patients become depressed in spirits, or quite melancholic, from the knowledge of the repulsion which this disease causes in those around them.

The preceding symptoms may be modified according to the severity of the disease. In some cases there is merely an occasional discharge of crusts and only slight fetor, while in others the discharge is enormous and the fetor intense. The odour is not always in proportion to the amount of retained crusts and secretion. It also varies in the same individual at different times. In some females it has been observed to increase regularly at the menstrual periods, and it has been observed to diminish or disappear in certain subjects during pregnancy.

Hoarseness is a tolerably common symptom in patients suffering from atrophic rhinitis. This may be due to a simple catarrh of the larynx, to which these patients are subject; but in certain cases, dry adherent crusts may form in the larynx, about the vocal chords, or the inter-arytenoid fold, in the subglottic region, and especially in the upper part of the trachea, where they can be detected with the laryngoscope. These crusts may have the same fetid odour as those in the nasal passages. In these cases, therefore, complete removal of crusts from the nose will not entirely abolish the fetor of the breath. This complication has been described as laryngo-tracheal ozæna. There will usually be a good deal of cough, especially in the morning, in connection with this condition, and the crusts will be expectorated from time to time.

There is a peculiar aspect which is common, though not constant, in the subjects of fetid rhinitis. The nasal bones are sunken, and the bridge of the nose is broad and flattened. The anterior nares are large, and the plane of the orifices looks more forward than natural (snub-nose). Many, also, present

thick lips, *acne punctata*, enlarged glands, and other so-called strumous signs. On the other hand, some patients present no external peculiarity of nose or face.

Examining the interior of the nose from the front, in a well-marked case, the first thing that usually strikes us is the spacious, roomy character of the cavities. The mucous membrane presents a dry, glazed, pale appearance, but is almost sure to be hidden, in greater or less part, by dried adherent flakes and crusts. Large greenish or brownish masses may be seen impacted in various parts of the cavities; in the olfactory slit, at the anterior end of the middle turbinated body, on the posterior part of the floor, or elsewhere. It will generally be necessary to cleanse the passages in order to make a thorough inspection. The mucous membrane will then present an unexpectedly healthy surface, congested at first from the effects of the washing, but afterwards paler than normal, without any sign of ulceration, or usually, even, of the most superficial erosion. It is obviously thin and shrivelled throughout, and nowhere, not even on the inferior turbinated body, has it a soft, velvety feel to the probe. The turbinated bodies are reduced in size, and from the thinness of their covering their contours show up more sharply than natural. The inferior turbinated may have almost disappeared, so that the inferior and middle meatus form one cavity. In consequence of the width of the passage the septum and floor of the nasal fossa are visible to a much greater extent than usual. The posterior part of the roof, formed by the anterior wall of the sphenoidal sinus, is also visible. A portion of the posterior wall of the pharynx is also easily seen from the front; and usually the Eustachian prominence, as well as movements of the levator cushion, and of the salpingo-pharyngeal fold, can be well seen.

In marked cases the naso-pharynx is always more or less involved. With the rhinoscopic mirror the surface will present a dry, glazed, atrophied appearance, being covered

with a thin layer of dried mucus, while largish green or brown lumps may be seen about the vault of the naso-pharynx or in the choanæ. The naso-pharyngeal space will be more roomy than normal, in consequence of the wasted condition of the mucous membrane, and especially of the adenoid tissue. Rosenmüller's fossa will appear deepened, and the Eustachian prominences stand out more sharply than usual.

The mucous membrane of the lower pharynx partakes more or less in the atrophic process. It has a dry, glazed, and shiny appearance, being covered with a varnish-like coating of dried secretion. The soft palate is often thin, and the uvula slender and threadlike.

The disease is essentially a chronic one, and, where atrophy is well advanced, may be reckoned in a sense incurable. The fetor, however, can be so thoroughly kept in abeyance in most cases that, though not cured, the disease can be relieved of its principal terrors. As age advances the fetid smell diminishes spontaneously, and it generally disappears after forty-five or fifty years of age.

The diagnosis of genuine ozæna must be cautiously made. Neither the history nor a mere casual inspection of the nasal passages can be depended upon. It is now well established that chronic suppuration of the accessory sinuses, and especially of the ethmoidal cells and sphenoidal sinus, may simulate ozæna so closely that only by patient and repeated examination of the nose can the diagnosis be made with any degree of certainty. All the less typical forms of ozæna should be especially scrutinized with care,—cases in which one nasal passage only is affected, cases in which the atrophy is only slightly marked, or confined to certain portions of the mucous membrane, cases in which there is chronic inflammatory swelling of the middle turbinal, and all cases in which the onset of the disease was apparently later than puberty.

With a view to ascertaining the existence of disease of the accessory sinuses, it is important to systematically remove

the crusts, so as to observe if pus flows from the region of the orifices of the various sinuses. Again, the nose having been thoroughly cleansed of all crusts and secretion, inspection should be made after a certain time, possibly some hours, in order to see if pus reappears in the position in which it is known to reappear in disease of the various sinuses. In this way a suspicion of disease of one or more of the sinuses may arise, and further methods of examination may establish the existence of such disease. (See Diseases of the Accessory Sinuses.)

In some cases genuine ozæna may be complicated by supuration of one or more of the accessory sinuses, so that the discovery of sinus disease by no means excludes the existence of true ozæna. In such a case the result of treatment of the diseased sinus would probably be the only test. It is a question whether the cases of sinus suppuration, which exactly simulate true ozæna, should not be considered to be special forms of chronic suppuration, of the same nature as ozæna. On this point nothing definite can be stated at present. The whole subject requires further elucidation.

Treatment.—The subjects of atrophic rhinitis are frequently such as to suggest the advisability of a course of cod-liver oil, iron, or arsenic, and sea-air is beneficial in most cases; but although constitutional treatment will sometimes be found a useful aid to local treatment, the latter is always of paramount importance.

In atrophic rhinitis, if the passages are thoroughly cleansed of crusts and secretions, the offensive odour disappears for a time. It quickly returns, however, and the crusts soon reform. If the crusts be removed daily, it will be found that, after a short time, the odour is longer in returning, and the crusts do not form so quickly or abundantly.

We must first, therefore, direct our treatment to the thorough, and regular, removal of all secretions from the nasal cavities and naso-pharynx. This is not always an easy matter. The

crusts are sometimes very hard and firmly impacted, and, in these troublesome cases, their removal should be undertaken in the early period of the treatment, as often as convenient, by the medical attendant. Irrigation of the nasal passages with an alkaline or alkaline disinfectant lotion (formulæ 1, 2, 3, 4) will mostly effect the purpose. It will, however, be often necessary, at first, to supplement the irrigation of the passages, by loosening and detaching the crusts with a probe dressed with cotton-wool. Irrigation of the nose may be performed with the ordinary nasal douche, Pins's douche, or the nasal syringe (see pp. 75, 76, 77). I generally recommend the syringe. In cases where the quantity of crusts and secretion is not great, a spray apparatus, used according to the directions at page 71, will be found sufficient for cleansing the passages, and it is certainly the most agreeable method for the patient.

The nose must be thoroughly cleansed once, twice, or even three times a day, at first, according to the severity of the case, and the rapidity with which the odour returns. After cleansing, I recommend a little finely-powdered boric acid to be insufflated into the passages. After a time the crusts will no longer form so rapidly, and the cleansing process will not require to be repeated so frequently; but many months, and it may be some years, may elapse before a daily cleaning can be dispensed with, if the symptoms are to be kept in complete abeyance. Whatever other local treatment be adopted, the cleansing process cannot be omitted. The exact fluid used does not matter very much. There is perhaps nothing better than a solution of bicarbonate of soda and borax (formula 1). In bad cases some disinfectant is certainly useful, while for ready use in emergency the patient can always be directed to fall back on a solution of common salt, a teaspoonful in a pint of tepid water. By the preceding method of treatment many cases can be brought into a condition in which the use of a detergent lotion daily, or even at longer intervals, will keep all the symptoms in complete abeyance.

The existence of a complicating laryngo-tracheal or tracheal ozaena, although not of very frequent occurrence, should be thought of, especially if the breath remains fetid in spite of thorough cleansing of the nasal passages. The complaint, if present, is best treated by inhalation of a fine spray of some alkaline disinfecting fluid, used once or twice daily, and, after a time, less frequently.

The insertion of tampons into the nasal passages, as first suggested by Gottstein, has a decided effect in softening crusts, and keeping the nose free from secretion and odour. The method has been a good deal misunderstood and misapplied. It has been laid down, by some, that the object is to arrest the nasal current of air, and so prevent drying of the secretions. The anterior nares alone are sometimes plugged, and special influence has been attributed to certain medicated wools. The main object of the treatment, however, is to produce a more fluid and more copious secretion, by stimulation of the surface with the tampon, and so keep the nose free from crusts. For this purpose a tampon of cotton wool must be prepared, about the length and thickness of the little finger. This is introduced into the nasal passage, after thoroughly cleansing it, and when in the passage, it is pushed up with a probe as high as possible in the cavity, so as to leave the inferior meatus free. The tampon is best introduced by means of a screw devised by Gottstein for the purpose, but it may be inserted with a pair of light dissecting forceps. The tampon should be changed twice in twenty-four hours, and may be worn in both passages simultaneously, or one passage may be tamponed in the day, and the other in the night.

The application to the mucous membrane of some oily or fatty substance has been advocated for the purpose of preventing the formation of crusts. M. Ruault strongly recommends a spray of liquid paraffin, to be used several times daily, as the best means of effecting this object. I have given this method a trial, but have been disappointed with the effect.

The question arises whether any other local treatment, beyond simple cleansing and disinfecting treatment, will help to arrest or alter the morbid process in the mucous membrane so as to aid in bringing about the condition of comparative or even actual cure which is aimed at. On the whole, it may be said that good results in this direction may be hoped for in many cases. I have found the codo-glycerine solution as useful as any application that I have tried. The most efficacious way to apply it is in the form of a tampon of cotton wool soaked in the solution. This is to be inserted like the Gottstein tampon, and pushed high up against the middle turbinal, and allowed to remain in situ for about an hour. The application should be repeated once or twice a week. The weaker solution of iodo-glycerine should be used—at first, at all events—and if it causes discomfort, only one passage need be treated at a time.

Various applications of a stimulant character have been recommended by different observers. Morell Mackenzie found the insufflation of powdered eucalyptus with starch (formula 23) very useful. Bosworth recommends sanguinaria and galanga (formula 24). Salicylic acid (formula 22) is also recommended. Any of these powders may be insufflated, daily at first, and afterwards at longer intervals. Moldenhauer speaks well of the effect of finely-powdered acetotartrate of aluminium, insufflated once or twice a week. Ruault recommends painting the mucous membrane with sulphuricinate of naphthol. A spray of a solution of thymol, of a strength of half a grain or a grain to the ounce (formula 15), is said to be a useful stimulating and antiseptic application.

During the last few years the so-called vibratory massage of the nasal mucous membrane has been warmly advocated by Braun, Demme, Laker, and others, in the treatment of ozæna. A stiff probe, the end of which is covered with a firm roll of cotton-wool, which may be impregnated with some antiseptic, is introduced into the nasal passage, and is brought in contact

with the mucous membrane with a series of very rapid vibratory movements. The sittings last two or three minutes, and are repeated daily at first, and afterwards at longer intervals. I have had no opportunity of judging of the results of this treatment, which not only demands much personal attention, but also special skill. I am inclined to think, however, that, with the same amount of attention, equally good results may be obtained by some of the methods previously described.

The so-called cupric electrolysis has been recently employed by various observers with apparent excellent results. The passages are first cleansed of all crusts, etc., and cocaine is applied. The copper needle attached to the positive pole is inserted into the middle turbinal, in a horizontal direction, to a depth of about an inch. The steel needle is inserted into the inferior turbinal or septum. The current is then passed, gradually increasing the intensity up to 8 or 10 milliampères, or perhaps a little more, but it should never exceed 15 milliampères. The current is allowed to pass for about ten minutes, and is then gradually reduced to zero. The current is then inverted, the steel needle being connected with the positive, and the copper needle with the negative pole, raised to 10 milliampères for two or three minutes, and then reduced to zero, when the needles are withdrawn. The application may be repeated after a week in the opposite nostril. As a rule, within a few days of the application, there is a marked diminution of the fetor and crusts. Two or three applications may have to be made to each nasal passage to obtain the best results. There is no doubt that this treatment produces a marked diminution of the fetor and crust formation, and in some cases a complete cure of these symptoms. Relapses have, however, been reported. The treatment is somewhat painful, and occasionally giddiness and syncopal attacks have been observed during the application.

The discovery of the pseudo-diphtheria bacillus in the

secretions led to the employment of injections of diphtheria antitoxin in ozæna. Temporary benefit appears to result from these injections in many cases, but the results, on the whole, have not been such as to commend this form of treatment in ozæna.

VIII. ACUTE NASO-PHARYNGITIS (*Acute Naso-pharyngeal, or Post-nasal Catarrh*).

ACUTE catarrhal inflammation is never wholly confined to the naso-pharynx; the nose, or lower pharynx, being always simultaneously affected. The brunt of a catarrhal attack may, however, fall on this region, and particularly on the pharyngeal tonsil, which is often the chief seat of the inflammatory condition. All the causes which give rise to acute rhinitis, such as colds, chills, direct irritants, etc., may lead to a similar condition in the naso-pharynx. In certain infectious diseases, such as measles, scarlet fever, and typhoid, the naso-pharynx is frequently inflamed.

The process is characterized by redness and swelling of the mucous membrane on the postero-superior wall, in the fossæ of Rosenmüller, and on the Eustachian prominences. The region of the pharyngeal tonsil will often present marked swelling (*acute pharyngo-tonsillitis*). In children and young subjects, the inflamed pharyngeal tonsil may form a more or less voluminous, reddish, indented, or deeply furrowed mass. Whitish patches may be present in and about the orifices of the lacunæ of the tonsil, exactly like those observed on the faucial tonsils (*follicular pharyngo-tonsillitis*). This is not unfrequently seen associated with acute follicular faucial tonsillitis.

The symptoms are chiefly local, consisting of a sense of discomfort, dryness or burning, referred to the top of the throat and back of the nose. There is only slight pain in

swallowing. General malaise, and some febrile symptoms may be present. Headache is commonly complained of, mostly in the occipital region, or the pain may be referred to the nape of the neck. Nasal respiration will be more or less impeded. This trouble will, of course, be more marked in children and young subjects, with swelling of the pharyngeal tonsil. Mouth-breathing, alteration of voice, and other results of nasal obstruction, may be present in a marked degree. The dryness of the early stage gives place in a day or two to increased secretion, which is of a thick, tenacious character, mucous at first, and then muco-purulent. The secretion partly finds its way forward through the nose. It may collect in a large mass in the naso-pharynx, so as to completely obstruct nasal respiration, and it may be seen coming down from behind the soft palate. The removal of the secretion from the naso-pharynx is effected by inspiratory snorts, hawking efforts, and blowing the nose. A little blood, or blood-stained secretions, from the naso-pharynx, is not uncommon. The symptoms gradually disappear in six or seven days. Ear troubles not uncommonly arise in the course of the attack, such as deafness, tinnitus, and earache. Middle-ear suppuration may also occur, and is, indeed, the chief danger. In children repeated catarrhal attacks in this region lead to gradual hypertrophy of the pharyngeal tonsil.

The diagnosis can usually be made from the symptoms, but, when possible, a posterior rhinoscopic examination should be made in order to verify the diagnosis.

Treatment.—No special treatment is needed in the early stages, apart from such general treatment as is found useful in acute rhinitis and other acute catarrhal affections. In a later stage a tepid alkaline lotion (formula 1, 2, or 3), applied through the anterior nares, will be found useful in removing the secretion, if it cause much trouble; but in young subjects, in whom the naso-pharynx is blocked by inflamed adenoid growths, irrigation of the nose is not advisable. Gargling the

throat with the same lotion will help to remove the secretion which trickles down the pharyngeal wall. There is no doubt that catarrhal inflammation of the naso-pharynx tends in many cases to linger and pass into a chronic form. This must be borne in mind, and some of the measures recommended in the treatment of the chronic form must be adopted, when the complaint shows such tendency.

IX. CHRONIC NASO-PHARYNGITIS (Chronic Naso-pharyngeal, or Post-nasal Catarrh).

Causation and Nature.—Chronic catarrh of the naso-pharynx is often associated with a similar affection of the nose, or lower pharynx. All the causes which lead to the production of chronic rhinitis, and chronic pharyngitis, are of import here. Many authors have attributed an especially baneful influence to the continued inhalation of air containing irritating admixtures, whether ordinary outdoor dust or particles arising from certain kinds of work. There is certainly a greater difficulty in removing such particles from this region than from the nose, or lower pharynx.

Chronic naso-pharyngeal catarrh is developed, not unfrequently, from relapsing attacks of acute rhinitis, in which, as already stated, the naso-pharynx is frequently more or less implicated. It is sometimes an extension of a chronic rhinitis, and in a particular form it is a usual accompaniment or extension of chronic atrophic rhinitis. It is sometimes a sequel of measles, scarlatina, and other infectious diseases, and it tends to occur in persons addicted to alcohol, and in scrofulous or tuberculous subjects.

Many local causes give rise to the affection. Abnormalities in the nasal passages, and nasal obstruction from any cause, may lead to it. The most important factor in its production, however, is the pharyngeal tonsil, and it is in and around this structure that chronic catarrh is most frequently located. In young subjects with hypertrophy of the pharyngeal tonsil (adenoid vegetations), more or less constant catarrh is a regular

accompaniment. In children the catarrhal symptoms are usually less noticeable than those arising from the encroachment of the hypertrophied tonsil on the naso-pharyngeal space, and these cases will be considered in the section on Adenoid Vegetations. In older subjects, where the naso-pharyngeal cavity is of relatively larger size, the catarrhal symptoms are more important. Moreover, as the tonsil undergoes retrogression in size, catarrh will often continue in the recesses of the tonsil, and may persist after all other evidence of the antecedent hypertrophy has disappeared. Tornwaldt first drew attention to the fact that a considerable number of cases of post-nasal catarrh are due to an affection in the region of the pharyngeal tonsil, and only yield to direct treatment of this part. Tornwaldt, however, appears to have laid undue stress upon the frequency of a catarrh localized in the recess known as the pharyngeal bursa (see p. 19).

The anatomical changes in chronic naso-pharyngeal catarrh are more or less congestion in the early stages, and, later on, thickening and hypertrophy of the elements of the mucous membrane. The pharyngeal tonsil and solitary scattered masses of adenoid tissue may be enlarged to a greater or less degree. The mucous membrane over the Eustachian prominences and salpingo-pharyngeal folds, and in the fossæ of Rosenmüller, becomes thickened. In certain cases, mostly those of long-standing, the adenoid tissue and the glands of the mucous membrane gradually atrophy, causing the membrane to assume a thin, smooth, and polished appearance, and the cavity of the naso-pharynx to become more spacious. Occasionally, owing to occlusion of the orifice of the median recess, or of some neighbouring recess, of the pharyngeal tonsil, the secretion collects in the cavity, and a cyst is formed (*Tornwaldt*).

Symptoms.—The symptoms of chronic catarrh of the naso-pharynx are in great part caused by the secretion which collects there, and is discharged thence into the lower pharynx. It must be remembered, however, that a similar discharge

of mucus or pus is a symptom of many diseases of the nose, the secretion passing backwards from the posterior nares into the naso-pharynx. Such cases are often described as "post-nasal catarrh;" but although some chronic naso-pharyngitis very often coexists, it is very important, from the point of view of treatment, to distinguish between the two conditions.

The patients usually complain of an uneasy sensation in the upper part of the throat, or of dryness in that region, or of a feeling of a foreign body there. They endeavour to clear the throat by constant "hems," or by noisy nasal inspiratory jerks and hawking efforts. They not unfrequently retch or vomit in the efforts to clear the throat, especially in the morning, when the discomfort is generally greatest.

Deafness and noises in the ears often arise in the course of the disease, from affection of the Eustachian tubes and imperfect ventilation of the tympanum. Dull headache, frontal or occipital, pains at the nape of the neck, and inaptitude for work, especially mental work, are often present in severe cases. A somewhat stale, disagreeable odour of the breath is not uncommon, especially in the mornings. The coexistence of chronic nasal catarrh, and of chronic pharyngitis and laryngitis, often complicates the case with symptoms referable to these complaints.

On rhinoscopic examination, the mucous membrane of the naso-pharynx may present some redness, usually not marked, some swelling of the pharyngeal tonsil, and some granular elevations on the posterior wall of the pharynx. More or less greyish or yellowish secretion will be seen over the surface of the pharyngeal tonsil, in the fossæ of Rosenmüller and down the pharyngeal wall. In some cases the secretions tend to dry, and adherent crusts will be seen on the posterior wall, while the surface generally may be covered with a dry varnish-like coating.

In the cases to which Tornwaldt drew particular attention, the source of the secretion is chiefly or wholly the median

recess, or bursa, already described. According to his description the orifice of the bursa may be seen covered with an adherent mass of secretion. One may sometimes, on loosening this, be able to observe its connection with the bursa by a little thread of mucus, proceeding from its orifice. This secretion has often a great tendency to dry, especially during the night-time, and may form a large adherent crust more or less heart-shaped or triangular, with the apex upwards, and extending downwards over the posterior wall of the pharynx for a variable distance. Tornwaldt lays stress, as a diagnostic point, on the fact that the upper part of the pharyngeal wall, between the bursal orifice and the choanæ, is free from secretion. When, from retention of secretion, a cyst is present, it will present the appearance of a rounded, glistening swelling of a yellowish or bluish colour, of the size of a small cherry-stone or larger (*Tornwaldt*).

The appearance of the buccal pharynx varies with the degree and nature of the naso-pharyngeal malady. There is often a covering of yellowish secretion seen which has trickled down from the naso-pharynx. Sometimes viscid greenish semi-inspissated or dried crusts are present, or the surface has a smooth, dry, polished appearance, owing to the presence of a thin coating of dried mucus. Granulations may be present, and often dilated tortuous veins are seen. In cases where there is crusting on the posterior wall, the larynx often presents a dry, red appearance, and a greenish crust is often present on the inter-arytenoid fold.

Treatment.—The removal as far as possible of all causative influences must be first thought of, and morbid conditions of the nose and the lower pharynx should be treated concomitantly with the naso-pharynx. Tobacco and alcohol must be restricted, or altogether prohibited. Constitutional treatment may be indicated in scrofulous, anæmic, or syphilitic subjects.

The treatment of the disease is mainly local. Should the

trouble depend on hypertrophy of the pharyngeal tonsil, the removal of the hypertrophied tonsil is, of course, indicated. The systematic removal of the secretion is, in many cases, the first thing to be attended to, and this is most easily effected by means of a tepid alkaline lotion (formulæ 1 to 4). It may be applied with a syringe or douche, or spray apparatus, through the anterior nares, the more so as there is usually accompanying chronic rhinitis. The cleansing must be repeated two or three times daily, if necessary, at first, and afterwards once a day. Much benefit will generally follow this treatment, so much so, that patients can sometimes leave off the irrigation without return of the symptoms. Where there is dryness and crusting of the secretions, the warm alkaline irrigation will afford much relief. In certain cases, where the secretion is not abundant, or has abated, and in some cases where there is dryness, a liquid paraffin spray will be found to relieve the patient. Liquid paraffin alone, or containing menthol, eucalyptol or camphor, in solution (formula 16, 17, 18), may be used through the anterior nares with the oil atomiser two or three times a day.

In obstinate cases, a more active local treatment may be required. The local application of iodine is generally beneficial. This may be applied in the form of the iodo-glycerine solution or as a watery solution (formula 13, 14). A mop of cotton-wool on the end of a bent holder is to be passed up behind the soft palate and briskly rubbed on the posterior wall, the application to be repeated every other day, or less frequently according to the severity of the case, the tolerance of the parts, and the strength of the solution used. The condition of the lower pharynx will often indicate a simultaneous application to that region. The iodine treatment is beneficial in most forms of chronic naso-pharyngitis, unless the disease is distinctly localized in the recesses of the pharyngeal tonsil. It is best as a rule to begin with weaker solutions, and then gradually increase the strength.

In any case, treatment must be persisted in for many weeks before decided benefit can be obtained. The chief reason, however, why symptoms of so-called post-nasal catarrh are found so obstinate, and apparently uninfluenced by remedies, is, I believe, in most cases, that the real cause is overlooked, and therefore not remedied. Some form of nasal obstruction, for instance, or a chronic discharge from one of the accessory sinuses, is often the real disease, and it is useless to treat the post-nasal symptoms while this is left unrelieved.

When the disease is localized in the recesses of the pharyngeal tonsil or in the so-called bursa, various procedures have been recommended, such as the direct application of nitrate of silver or the galvano-cautery point to the interior of the recess. The most rapid and effectual treatment, and at the same time the most easily carried out, is to scrape away the bursa and remains of the pharyngeal tonsil with a sharp spoon or a Gottstein's curette. A general anæsthetic will mostly be required in order to accomplish this in an efficient manner.

X. ADENOID VEGETATIONS OF THE NASO-PHARYNX (Hypertrophy of the Pharyngeal Tonsil).

HYPERTROPHY of the pharyngeal tonsil is no doubt a better name for this disease than adenoid vegetations. The term adenoid vegetations was, however, originally used by Meyer of Copenhagen, who first described the disease, and it has since been almost universally employed to designate it.

Causation and Nature.—The disease is common, and, like the same condition of the faucial tonsils, with which it is frequently associated, it belongs especially to childhood. Some cases date from birth, and many commence in the first or second year. Most cases commence about three years of age. Adenoid vegetations are met with, commonly enough, up to fourteen or fifteen, after which they are rarer. They are, however, met with occasionally in adult life. When met with at this period the commencement of the affection dates back to childhood. The subsidence and gradual disappearance of the vegetations as age advances are due to atrophy of the lymphoid tissue, and in some measure to the organization of inflammatory products. The disappearance of symptoms is, however, partly due to the increased roominess of the naso-pharyngeal region, in consequence of which the growths occupy a relatively smaller part of the space.

There does not seem to be a greater prevalence in either sex. Inherited syphilis has probably no influence. The children of a tuberculous stock do not seem to be more liable to the complaint. The liability is undoubtedly hereditary, and it is not infrequent to observe one or both parents and

several children in a family affected. Catarrhs, and the acute exanthems, especially measles, which lead to catarrhal conditions, are often the starting-point of the disease. Cleft palate is usually accompanied by adenoid vegetations, the local irritation caused by contact of food, and cold air, initiating the disease in these cases.

As already stated, the disease consists of an overgrowth of the collection of adenoid tissue in the vault of the nasopharynx, known as Luschka's tonsil, occupying the region between the Eustachian tubes on either side, and between the margin of the choanæ above and the arch of the atlas below. The hypertrophied tonsil may form a rounded, prominent, more or less uniform mass, marked with antero-posterior indentations, or it may be broken up by antero-posterior and cross furrows to a greater or less extent, and may thus present the form of a mass of cylindrical or conical growths or vegetations. The vegetations often occupy the fossæ of Rosenmüller, and are grouped round the Eustachian opening; but it is doubtful whether they spring from the fossæ of Rosenmüller or the lateral wall of the naso-pharynx, the vegetations occupying the positions just mentioned, proceeding really from the postero-superior wall, and encroaching in their growth on the lateral regions.

The consistence of adenoid vegetations is mostly soft, but sometimes, especially in older subjects, it is somewhat tough. The colour varies from pale pink to dark red. The structure is similar to that of enlarged tonsils, viz. adenoid tissue, covered in parts with cylindrical ciliated epithelium, in parts with cubical or squamous epithelium. In the firmer growths, met with in older subjects, there is a more marked development of fibrous tissue. The structure is generally very vascular.

Several observers have recently demonstrated the presence of tuberculous tissue and tubercle bacilli in adenoid vegetations. There is a diversity of opinion as to the frequency of this

occurrence, but at present it appears to me that the balance of evidence is in favour of its being quite exceptional.

Symptoms.—Adenoid vegetations lead to a series of symptoms, some of which depend on the impediment to the current of air through the naso-pharynx, others on interference with the movements of the soft palate, and others again on the vascularity and copious secretion from the vegetations, and the catarrh of the neighbouring mucous membrane.

The interference with nasal respiration leads to the earliest, most constant, and most characteristic signs of the disease, and the description of the effects of chronic nasal obstruction in children, given in a previous section, applies particularly to cases of adenoid vegetations. There is no other condition which so frequently gives rise to nasal obstruction in children as this. It is rare, however, that the amount of the growth is such as to cause complete obstruction. The upper part of the choanæ is blocked, but there is nearly always some passages for air at the lower part, although this too may often get blocked with mucus. So long, however, as the impediment to respiration is enough to set up more or less habitual mouth-breathing, the usual symptoms of chronic nasal obstruction come into relief.

Children with adenoid vegetations breathe chiefly or wholly through the mouth. They are apt to breathe noisily, especially when eating or drinking. They sleep with the mouth open, and breathe noisily, or snore. Suffocative attacks, such as are described in the section on nasal obstruction, are common, especially in young children. In infants there may be difficulty in sucking. The sleep of children with adenoid vegetations is usually broken and disturbed; they toss about restlessly in bed, moan and talk, and night terrors are common. They often perspire profusely in sleep. A constant hacking or barking cough is a common symptom, quite independently of any bronchial complication, and this cough is often chiefly or solely troublesome for some hours after going to bed.

Laryngismus stridulus appears to be often dependent on adenoid vegetations. A proneness to catarrhal affections of the larynx and bronchi is often present. Bronchial asthma and paroxysmal sneezing are sometimes connected with adenoids, whether reflexly excited or otherwise is uncertain. The deformity of the chest resulting from buccal breathing has been already referred to (p. 96).

Prolonged mouth-breathing imparts to these subjects, in



FIG. 42.—Adenoid Vegetations. Facial Aspect.

well-marked cases, a characteristic facial aspect. The lower jaw is dropped, and the lips are kept constantly parted. The upper lip is often short, and leaves the upper teeth partly uncovered. The dropping of the jaw draws upon the soft parts, and tends to obliterate the natural folds of the face (nasolabial and naso-malar). The eyebrows are often elevated, and the inner canthi of the eyes drawn down. The face has an elongated appearance, and the expression is vacant, listless, or

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even stupid. The nose is narrowed and pinched from long-continued inactivity of the *alæ nasi*. The root of the nose, on the other hand, is often flat and broad.

The peculiar deformity of the upper jaw which is so often associated with chronic mouth-breathing in children has been already referred to in the section on Nasal Obstruction. The typical changes often observed in a pronounced case of adenoid vegetations are as follows: When the disease sets in during early childhood, there is observed a high arched palate, with lateral compression of the alveolar arch, and elongation in the antero-posterior direction. The milk-teeth, however, present no abnormality in their position. If the disease persists to the period of the second dentition, the approximation of the lateral parts of the alveolar arch becomes more marked, and the antero-posterior elongation greater. The arch of the palate becomes higher, and the top of the arch more pointed. The fore part of the alveolus projects more and more forwards, and there occurs an angular bend between the central permanent incisors, the alveolar arch thus assuming a V shape. The lingual surfaces of the central incisors, instead of looking directly backwards, are turned somewhat towards each other. The lateral incisors are set almost antero-posteriorly, and the canines are often pushed out of place. The elongation of the upper jaw often causes the upper incisors to project far beyond the corresponding teeth in the lower jaw. The high arched upper jaw is often observed to be associated with deflected septum. The lateral compression of the upper jaw has been attributed to pressure of the cheeks, resulting from dropping of the lower jaw. One must, however, suppose also some weakness of the bone. This deformity is by no means always present in cases of adenoid growths, and, with respect to this and other deformities associated with adenoid growths, one must consider the possibility of a primary tendency to anomalies of growth and development, of which the adenoid hypertrophy may itself be a manifestation. Among other deformities not unfrequently

present in cases of adenoid vegetations, are deformities of the spine, viz. some lordosis of the cervical vertebra, with kyphosis of the dorsal region, and sometimes slight scoliosis.

Speech is affected in a characteristic way by the obstruction in the naso-pharynx. From a lack of the natural resonance it acquires a dead character. There is inability to pronounce the nasal consonant sounds, *m*, *n*, and *ng*, and the *l*, *r*, and *th* sounds are altered. Some backwardness in learning to articulate clearly is often observed. Adenoid vegetations are said to be commoner among children who stutter, so that there is probably a connection in some cases.

Deafness is very frequently present, varying in degree, transient or permanent. Attacks of earache and otorrhœa are common. The ear troubles sometimes arise from propagation of catarrh from the naso-pharynx to the tympanic cavity; sometimes they are due to the direct action of the growths, blocking the Eustachian orifice, or pressing upon the Eustachian cartilage, and so preventing the tube from opening. The ventilation of the tympanum may be further impeded by the interference with the movements of the soft palate, and with the full action of the muscles which dilate the tubes. Ear troubles in children are undoubtedly, in the vast majority of cases, dependent on the presence of adenoid vegetations.

Children with adenoid vegetations are very liable to colds in the head, which aggravate all the symptoms, and in the slighter forms of the disease the symptoms may hardly be noticeable, except when the child is suffering from a cold. The pharyngeal tonsil itself may partake in the catarrhal attack, and swell up considerably. Chronic rhinitis is often set up by the presence of adenoids, and hypertrophic rhinitis, affecting principally the posterior extremity of the inferior turbinals, is undoubtedly one of the sequelæ left by adenoid vegetations, keeping up the nasal obstruction when the adenoids themselves have more or less disappeared. A chronic purulent nasal discharge often develops, especially in children. There is often a semi-

purulent secretion trickling over the posterior pharyngeal wall from the naso-pharynx. On the other hand, some children with adenoid vegetations never have any nasal discharge, and a complaint the mother often makes is that the child never blows its nose like other children.

More or less constant dribbling of saliva from the mouth is a symptom occasionally caused by adenoid vegetations, especially in young children. The flow of saliva may be so great as to saturate the child's things several times a day. More often the dribbling occurs principally or wholly during sleep. In the morning there will often be a discharge of saliva and mucus, sometimes blood-stained, on the pillow, or blood may be noticed in the mouth or on the lips. Occasionally a little blood will be hawked up in the daytime. The bloody discharge results from the great vascularity of the vegetations.

Headache is a not uncommon symptom, mostly seated in the frontal region, sometimes in the occipital. Irritability of temper sometimes appears to be a symptom of the complaint. Some children are also rather dull in intellect and backward at school, but this is often accounted for by their deafness. Many children, with a marked degree of adenoid hypertrophy, are quite bright and forward at school.

There are a few other conditions besides those already mentioned which have in certain cases been attributed to the presence of adenoid growths, or have been benefited by their removal. Among these may be mentioned nocturnal enuresis, chorea, and epileptic symptoms.

When adenoid vegetations persist into adult life, they continue to give rise to most of the symptoms already described, although the relatively larger size of the naso-pharynx may render the symptoms less marked. As a matter of fact, these patients mostly seek relief for symptoms of naso-pharyngeal and pharyngeal catarrh. They complain of dryness of the throat on waking, and they hawk and cough in order to clear the

viscid secretion from the throat. The vegetations, even when they have undergone a considerable amount of atrophy, continue not unfrequently to give rise to a troublesome chronic naso-pharyngitis (p. 153).

On examination of the buccal pharynx in cases of adenoid vegetations, rounded or irregular red elevations will often be seen in the posterior wall, outgrowths of adenoid tissue in this region. Similar elevations are sometimes seen on the posterior faucial pillars. The tonsils are often enlarged. A good deal of muco-purulent secretion will sometimes be seen on the posterior wall, proceeding from the naso-pharynx. A marked immobility of the soft palate, which hangs forwards at a considerable distance from the pharyngeal wall, will sometimes be noticed in adenoid cases. Swelling and hypertrophic conditions of the nasal passages frequently accompany adenoid vegetations. The glands beneath the angle of the jaw are not unfrequently more or less enlarged.

Although a correct estimate can usually be formed of the nature of the case from the history and symptoms, a certain diagnosis can only be made by means of physical examination of the naso-pharynx. Posterior rhinoscopy and digital palpation are the two methods at our disposal, and one or both methods should be employed. Rhinoscopic examination is often difficult, and sometimes impossible, owing to the age

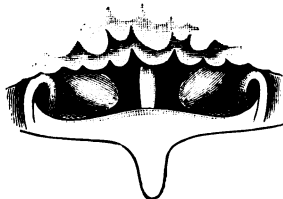


FIG. 43.—Adenoid Vegetations (Rhinoscopic view).

of the patient; but in quiet, tractable children over six or seven years of age, it can generally be made. When the mirror is placed so as to bring the choanæ into view, the upper end of the septum and the upper arched portions of the choanæ will be more or less hidden in the rhinoscopic image by rounded projections, or it may be by a large rounded, smoothish, or more or less indented or lobulated mass, situated in the postero-

superior wall (vault) of the naso-pharynx. If the naso-pharynx be much crowded with vegetations the natural structures cannot be distinguished, and only a confused reddish mass will be seen projecting forwards from the posterior wall, or at most a narrow slit will be discovered between the adenoid mass and the soft palate, across which a layer of mucus will often be seen extending. At best only an imperfect idea of the shape and depth of the hypertrophied mass can be obtained, but even a momentary glimpse obtained with the rhinoscopic mirror may be sufficient to confirm the diagnosis of adenoid growths, in a patient exhibiting characteristic symptoms of the complaint.

In cases where a rhinoscopic examination cannot be made, the finger should be passed up behind the soft palate. When the vegetations are very large and abundant the finger will often seem to break through a soft, friable mass as it is passed up to the roof, or a feeling as if the finger were thrust into "a bunch of earth-worms," as Meyer expressed it, may be experienced. Not unfrequently a firm, more or less compact, projecting mass may be felt projecting from the vault, giving the sensation of a more uniform hypertrophy of the pharyngeal tonsil. Owing to their softness and vascularity, the vegetations will usually bleed when touched, and the finger, when withdrawn, will be found smeared with blood.

Although adenoid vegetations, like the normal pharyngeal tonsil, usually tend, with the approach of adolescence, to diminish and disappear, they constitute, during childhood, a constant source of danger and trouble, and not unfrequently inflict permanent mischief. Not only do they predispose to inflammatory affections of the pharyngeal and respiratory passages, but children affected with adenoid vegetations are less able to cope with diseases in which these parts are implicated. Diphtheria, scarlet fever, measles, whooping-cough, and other diseases are apt to assume a more severe type in these children.

Deafness, mouth-breathing habit, and imperfect resonance of voice, as well as the characteristic expression of face, will often remain as permanent effects of the impairment of function due to adenoid vegetations in childhood, even though the vegetations themselves may have more or less completely disappeared. The collapsed state of the *alæ nasi*, and wasted condition of their muscles, resulting from long disuse, often contribute to the perpetuation of the mouth-breathing habit. On the other hand, the rapid improvement, after a timely removal of the growths, is very striking.

Treatment.—Neither internal nor local remedies appear to have any decided influence in causing the decrease or disappearance of adenoid growths. Once we have made up our minds that chronic hypertrophy of the pharyngeal tonsil is present in a degree sufficient to injuriously affect the patient, whether by reason of the impediment to nasal respiration, or the presence of ear troubles, or of some of the other effects which have been alluded to, it is better to proceed at once to the removal of the growths. There are, however, some cases in which, although there is evidence of slight hypertrophy of this tonsil, the symptoms are trivial, perhaps only appearing during or after a cold. In such cases we are justified in giving a trial to cod-liver oil, iron, and sea-air, and under such treatment the symptoms will sometimes undergo a marked improvement.

Having decided to operate, the sooner we do so the better, no matter how young the patient may be. Chemical caustics and the electric cautery have been completely given up in the treatment of this disease, and some method by which the vegetations can be completely removed is now universally employed. A large number of instruments have been devised for the removal of these growths, and in this, as in other operations, each operator no doubt works best with the instrument he habitually employs. A sharp forefinger-nail is preferred by some operators to any instrument, and no doubt soft

vegetations, if not very abundant, may be easily scraped away with the finger-nail; but in the majority of cases the finger-nail cannot be relied upon to thoroughly clear out the nasopharynx at one sitting, and there is no method of operating after which a repetition of the operation is more frequently required than that in which the finger-nail alone has been used. A few operators employ an artificial finger-nail made of steel, which is fitted on the forefinger, and with which vegetation can be scraped away. It is not, however, a satisfactory method.

Various instruments have been introduced for the removal of adenoid growths. Some kind of cutting forceps, or curette,

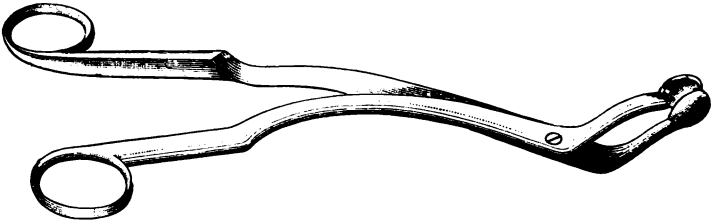


FIG. 44.—Woakes's modified Loewenberg's Post-nasal Forceps.

or ring knife is generally used. Among forceps, Woakes's (Fig. 44), modified from Loewenberg's pattern, is a good instrument, and has been much used in this country. M. Ruault's forceps (Fig. 45) is also a very good instrument, and one which I formerly used a good deal. The shorter handles and larger cutting extremities in this forceps render it more serviceable than most other patterns.

The instrument which is perhaps most largely used at the present time for the removal of adenoid growth is Gottstein's curette (Fig. 46). I have completely given up the use of forceps in favour of this instrument. It is really a form of ring-knife, and is made in three sizes. The ring is passed up behind the soft palate to the vault of the pharynx, and the adenoid growths are engaged in the ring, and detached

by a quick sweep downwards of the instrument. If properly used, the whole of the enlarged pharyngeal tonsil can, in some cases, be engaged and removed with one sweep of this curette.

In the case of older and more tolerant subjects, when no anæsthetic is used, the patient may be seated in front of the operator, and the instrument may be passed up behind the

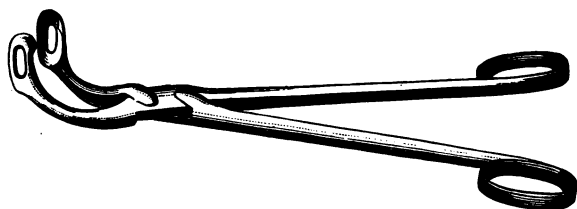


FIG. 45.—Ruault's Post-nasal Forceps.

soft palate, guided by the rhinoscopic mirror or the forefinger. More often, instead of the mirror or guiding finger, a previous careful inspection or palpation of the situation and extent of the vegetations must be trusted to in order to remove them. Young children must be held securely in the arms of a nurse seated in front of the operator, and the mouth kept open with a gag held by an assistant, who also steadies the child's head.



FIG. 46.—Gottstein's Post-nasal Curette.

It is far better, however, as a rule, to use a general anæsthetic. When anæsthetized, the patient may lie on the back with the head hanging down over the end of the table, but the neck should not be over-extended. In this position the blood is not so likely to get into the air-passages as it would be in the ordinary recumbent position. I prefer, however, to place the patient on the right side, with the thighs flexed, and

the head on a low pillow and bent a little forwards. In this position the blood runs freely out of the mouth and nose during the operation, and the position is very convenient for using either the forceps or Gottstein's curette. A gag must be employed to keep the mouth open. Except in the case of very little children, the left forefinger should be used to guide the manipulation of the instrument employed for removal of the vegetations, and at the end of the operation the right forefinger should be introduced to scrape away with the nail any small vegetations, remnants, or loose tags that may remain. The fossæ of Rosenmüller, the immediate vicinity of the upper end of the septum, and the arches of the choanæ should be carefully explored and cleared with the finger-nail as far as possible. In every operation for removal of adenoid vegetations sharp bleeding must be expected, and the mouth and pharynx may require to be sponged out frequently. The bleeding, however, very quickly ceases after the operation is complete. If enlarged tonsils are present, they had better be excised first, and the adenoid growths then removed.

Chloroform is generally preferred for young children, and gas and ether for older children and adults. Nitrous oxide gas alone is advocated in all cases by some experienced operators, such as Dr. Dundas Grant, on account of its greater safety. I share, however, the opinion generally held, that while certain cases can be satisfactorily operated on under gas, it does not as a rule afford sufficient time to ensure a thorough removal of the growths. When nitrous oxide gas is employed, the patient may be placed, if desired, in a sitting position.

It is needless to say that the utmost cleanliness should be observed both as to fingers and the instruments used in the operation, this being the surest safeguard against the occurrence of acute otitis media, or other inflammatory attack, after the operation. It is desirable to keep the child in bed for a couple of days after the operation, and to keep it in the house for a

week or so, depending on the time of year. No local after-treatment is necessary.

The result of the removal of adenoid vegetation is usually most satisfactory, especially in young children. Nasal respiration is re-established, and the expression of the features is changed for the better. The voice regains its natural resonance, defects in hearing rapidly disappear, sleep is quiet and tranquil, and the general physique, and sometimes the intellect, undergo remarkable improvement. The deformity of the jaw, of course, remains, though in course of years there will be sometimes observed a tendency towards improvement in this respect. The mouth may continue to be kept open, although nasal respiration is re-established. Occasionally, in older children especially, the speech remains faulty after the operation; apparently from some imperfect action of the soft palate. In time, however, and if necessary with training, these defects disappear. Where no improvement in the mouth-breathing symptoms follows a thorough removal of adenoid vegetations it will be found that some cause of obstruction exists in the nasal passages themselves, such as a deflected septum, or hypertrophied rhinitis, which may have been previously overlooked. Abnormally small choanæ are sometimes accountable for the continuance of symptoms. In exceptional cases, nasal respiration does not become established as readily as usual after the operation, although no cause of obstruction exists, and a certain amount of enforced practice is indicated under such circumstances.

When adenoid vegetations have been imperfectly removed, although considerable improvement may be present for a short time, the symptoms recur after a few months. This is especially noted in cases where the vegetations have been simply broken up with the finger-nail. On the other hand, when once thoroughly removed, adenoid growths do not recur. There are, however, some exceptions to this rule. In children operated upon at an early age, in whom there is a great

tendency to proliferation of lymphoid tissue, it will occasionally happen that after two or three years there will be a recurrence of symptoms, and adenoid growths will be present in sufficient quantity to demand a second operation. This is, however, exceptional, and most cases of recurrence are undoubtedly due to imperfect operation.

XI. REFLEX NASAL NEUROSES.

FOR some years much attention has been directed to the dependence of various morbid phenomena upon intra-nasal irritation. These phenomena embrace conditions, some of which are connected with the nasal apparatus, while others implicate more distant parts. They are variously sensory, motor, vaso-motor, and secretory in their nature, and as they have been held to arise in a reflex, or some analogous manner, they have been termed reflex nasal neuroses. The importance of the subject has, no doubt, been exaggerated by some observers, and the frequency of the dependence of many neurotic affections, on nasal irritation, has been overrated in some quarters.

The affections under consideration may be divided into two principal classes, viz.—

1. Those in which irritation in the nose give rise to symptoms in the nose itself, such as the various forms of nervous coryza.

2. Those in which irritation in the nose gives rise to symptoms in more or less distant parts, such as spasmodic cough, glottic spasm, asthma, etc.

There is a third class of cases which must also be mentioned, viz. those in which irritation in distant regions gives rise to nasal symptoms.

Although the connection between nasal disease and other morbid phenomena had not altogether escaped the older writers,* it was for practical purposes unrecognized, until

* See historical sketch by J. N. Mackenzie, *New York Med. Journ.*, August, 1887.

Voltolini,* in 1871, called special attention to cases of asthma dependent upon nasal polypi. His observations were soon confirmed by others (*B. Fränkel, Hänisch, Hartmann, Schäffer, Porter, etc.*), and about the same time the occasional dependence of asthma on chronic rhinitis was also demonstrated. The scope of the affections producible by nasal disease was soon extended. Hack, especially, drew attention to this subject in various contributions, but particularly in a monograph † in 1884. In this work, Hack set forth that turgescence of the erectile tissue on the anterior end of the inferior turbinated body, on one or both sides, resulted from a variety of causes, some of them seated in the nose itself, some acting from without; and that many neurotic conditions, such as cough, asthma, hay-fever, migraine, etc., arose in a reflex manner from stimulation proceeding from this part. He recorded cases in which these affections were cured by destroying the erectile tissue in this situation. This view, viz. that the erectile area on the anterior end of the inferior turbinated bodies is the point whence proceeds the stimulus which gives rise, in a reflex manner, to the affections in question, has not been confirmed by the observations of others, nor, indeed, by his own later observations. It is now admitted on all hands that other portions of the inferior turbinated body, the middle turbinated body, the septum and the naso-pharynx, are all, at different times, the seat of the irritation which gives rise to reflex symptoms.

Causation.—The diseased conditions of the nose which may give rise to morbid reflex phenomena are of a very varied character. Probably the most important are hypertrophic rhinitis, mucous polypi, and septal deflections, spines and crests. Other affections, such as synechiæ, foreign bodies or rhinoliths, crust-formation from any cause, and adenoid growths in the naso-pharynx may also be enumerated. Special regions

* "Die Anwendung der Galvanokaustik." Wien, 1871.

† "Erfahrungen auf dem Gebiete der Nasenkrankheiten." Wiesbaden, 1884.

of the nose, such as the anterior and posterior ends of the inferior turbinal, the posterior end of the middle turbinal, and certain parts of the septum have been supposed to be the special points of origin of reflex symptoms, but it is now generally held that any part of the nasal mucous membrane may be the starting-point of the irritation. The contact of otherwise distant surfaces, such as of the middle or inferior turbinated body with the septum, has a decided influence in setting up reflex symptoms. In this way periodic swelling of the cavernous tissue of the inferior turbinals, giving rise to contact between these bodies and the septum, plays an important part, no doubt in the production of reflex morbid phenomena. It may act as an intermediate link between various nasal abnormalities and the resulting neurosis, but this is by no means always the case.

The occurrence of morbid reflex phenomena is by no means common in comparison with the frequency of the various intra-nasal diseases and abnormalities above mentioned. It is clear, therefore, that some increased excitability of the reflex mechanism must be present in order that these reflex phenomena may be developed. This may consist in a heightened excitability of the sensory nerves of the nose, or of certain nerve centres, or some general neurotic condition such as underlies neurasthenia or hysteria may be present. This we may call the predisposition, and in this, heredity is often an important factor. Reflex nasal neuroses are not often met with in childhood. They are most common between puberty and middle life. Sex does not appear to have the influence one might expect, considering the importance of the neurasthenic element, both sexes being about equally frequently afflicted according to most observers.

The occurrence of various nasal reflexes has been demonstrated by various observers, in experiments on animals (*Sandmann, J. Lazarus, Kratschmer, Francois-Franck, etc.*). Francois-Franck performed an interesting series of experiments

with a view of elucidating this question. He was able to show by these experiments, performed on dogs, cats, and rabbits, that irritation of the inflamed nasal mucous membrane produced various disturbances in the respiratory and circulatory system (the respiratory and circulatory effects were alone investigated), such as laryngeal and bronchial spasm, spasmodic movements of the respiratory muscles, slowing of the heart's action, and dilatation of the vessels of the head, on one or both sides.

The sensory nerve endings in the nose, which are concerned in the production of reflex symptoms, are those of the fifth nerve. The olfactory nerve, however, seems occasionally to be the channel by which impressions are conveyed to the nerve centres, which give rise to reflex phenomena.

Symptoms.—The symptomatology of reflex nasal neuroses includes symptoms referable to a variety of functional disturbances in the nose itself and in various parts of the body.

The following are the principal affections which have been found to arise, more or less frequently, in connection with nasal disease or intra-nasal irritation of some kind, and in which a cure has been effected by treatment of the nasal condition.

Nervous or Periodic Coryza. Paroxysmal Sneezing.—Certain individuals are liable to be seized, at longer or shorter intervals, with such symptoms as sneezing, serous discharge, nasal obstruction, and conjunctival injection. Such attacks are apt to develop very suddenly and rapidly, and to subside equally rapidly. The attacks may last from some minutes to several hours or longer. The sneezing is sometimes very violent and prolonged, and often constitutes the most prominent symptom. In some cases the discharge from the nose is extremely profuse, and constitutes the main feature of the attack (*rhinorrhœa*). The rapid occurrence and subsidence of these attacks, and the absence of marked constitutional symptoms, serve, among other points, to distinguish them from attacks of acute rhinitis, though they are often referred to by

patients as "colds in the head." The objective appearances usually include marked redness and swelling of the mucous membrane, especially on the inferior turbinals, but sometimes the mucous membrane is remarkably pale and bloodless in appearance.

The essential element of the attack seems to be a vaso-motor disturbance, and the term *vaso-motor coryza* (*Herzog*) has been appropriately applied to the malady. The attacks result, undoubtedly, in a large number of cases, from irritation of a peculiarly hyperæsthetic nasal mucous membrane, and are, therefore, properly included in the class of reflex nasal neuroses. They are, indeed, the commonest and most familiar of this class of affections, and often precede, or accompany, the development of other neuroses affecting more distant parts. Whether we term the attacks nervous coryza, periodic coryza, vaso-motor coryza, paroxysmal sneezing, or otherwise, we must recognize that they belong to that large group of cases of which hay-fever is a well-known instance, in which coryza, and often other associated symptoms in the respiratory tract, are rapidly developed from a variety of exciting causes.

The actual exciting causes of attacks of nervous coryza seem to be almost innumerable. In a large number of cases the attacks occur without assignable cause. In many patients they are chiefly observed on rising in the morning. In women they are sometimes noticed to be most marked about the menstrual period. Dust of any kind, in- or out-door, is a frequent cause. Among the many causes which affect various individuals may be mentioned the pollen of a variety of plants, the powder of ipecacuanha, colocynth, scammony, or linseed, the exhalations from various animals, such as cats, dogs, horses, rabbits, hares, guinea-pigs, the skins of various animals, the odour of violets, and other scents. Sudden exposure to light will induce an attack in some individuals, especially in children. Attacks may also be induced, in certain persons, by sudden changes of temperature, by violent exercise, by impressions on the sensory

nerves of the skin, or by psychical causes. As an instance of the latter may be mentioned a case, reported by J. N. Mackenzie,* of a lady who suffered from such attacks whenever she smelt a rose, and in whom a severe attack was produced by smelling an artificial rose, which she believed to be real. The immediate exciting cause of the attacks in a large number of cases is unrecognized.

It is now well established that many of these patients suffer from some morbid condition of the nose, such as hypertrophic rhinitis, mucous polypi, or septal deformities, crests or spurs; but these conditions do not of themselves set up the symptoms unless a certain morbid predisposition is present, consisting presumably in one or both of these factors, viz. a hyperæsthesia of the terminal filaments in the nasal mucous membrane, and an undue activity of certain nerve centres. It is a question how far the various pathological conditions above mentioned may by prolonged irritation set up a morbid excitability of the nerves and nerve centres concerned.

Cough.—Cough is an occasional reflex result of nasal irritation. The cough is sometimes a frequently-repeated dry hack, or bark; sometimes it occurs in paroxysms, sometimes it is of a very severe convulsive character. It is necessary to bear in mind the possible nasal origin in cases where persistent cough cannot be accounted for by anything in the throat and chest. Mechanical irritation of the nasal mucous membrane, with a probe, will, in certain persons, produce cough. Both the anterior and posterior parts of the inferior turbinated body have been found, by different observers, to be the more sensitive part in this respect; but the cough will sometimes be produced by irritation of the middle turbinated body and of the septum. In other cases, again, irritation of the posterior wall of the naso-pharynx with a probe will excite cough. It must not be forgotten that cough, associated with nasal or naso-pharyngeal disease, may be due to a trickling down of

* *Amer. Journ. of Med. Sciences*, 1886.

mucus, from these parts, on to the inter-arytenoid fold of the larynx.

Bronchial Asthma.—The connection between bronchial asthma and nasal troubles is very striking. The asthma occurring simultaneously, or alternately, with the coryza of hay-fever is a well-known instance. Many people, subject to asthmatic symptoms, are liable to attacks of sneezing in the mornings, and the history of most asthmatics records a period when paroxysms of sneezing were common. Since Voltolini's observation, numerous cases have been recorded of asthma, associated with nasal polypi, and disappearing with their removal. Indeed, this relationship is familiar to every one who sees many cases of nasal polypi. Although the frequent dependence of asthma on intra-nasal disease is here insisted upon, it is not pretended that all cases of asthma depend on this cause, and still less that intra-nasal treatment will cure all cases. Asthma arises in predisposed subjects from various causes, and, moreover, to whatever cause it may owe its origin in the first instance, it may persist or reappear under the influence of some different cause. Even, therefore, in cases where there is every reason to believe that nasal polypi have set up the disease, the removal of the polypi may not always cure, nor perhaps even alleviate it. Besides polypi, other sources of intra-nasal irritation may set up asthma. Chronic turgescence of the erectile tissue on the anterior or posterior end of the inferior turbinated body, enlargements and diseased conditions of the inferior or middle turbinated body, deflections of, or outgrowths from, the septum, pressing upon one or other turbinated body, have all been found playing a part in the causation of asthma. Although complete nasal obstruction sometimes coexists with polypi and other nasal affections associated with asthma, it is by no means a necessary accompaniment, and there is frequently little or no obstruction. Indeed, cases of polypi, with complete nasal obstruction, have been recorded, where the asthma did not occur until partial

removal of the polypi had produced a passage for nasal respiration. It must be understood that not only definite, typical spasmodic asthma, but other bronchial affections of the catarrhal and asthmatic type may arise from intra-nasal irritation.

Spasm of the Glottis.—Cases of spasm of the glottis, presenting various features, have been recorded which appeared to depend on reflex irritation starting from diseased conditions in the nose. Cure of the spasm followed treatment of the nasal affection in many cases.

Paretic Conditions of the Vocal Cords, such as insufficient approximation, tremor, or imperfect adduction of one cord, have also been observed in association with nasal disease, and relieved by treatment thereof. The disappearance of functional paresis of the vocal cords, under stimulation of any kind, is, however, so commonly seen that little reliance can be placed on this as a proof of the causative relationship.

Cardiac Disturbances, such as irregularity, acceleration, or slowing of the heart's action, cardialgia, etc., have been traced to nasal irritation by various observers. The experiments of Kratschmer and François-Franck, above alluded to, lend support to the possibility of such a connection.

Exophthalmic Goître.—Hopmann, Hack, and B. Fränkel have reported cases of exophthalmic goître which have been cured by treatment of nasal disease. Semon has reported a case bearing on this subject. A few days after an operation for removal of nasal polypi with the galvano-cautery loop, exophthalmos of the right eye suddenly appeared. Graefe's and Stellwag's signs were present, but no thyroid enlargement or heart symptoms.

Ocular Disturbances.—Various ocular troubles, such as blepharospasm, strabismus, anomalies of accommodation, asthenopia, etc., have been described as arising reflexly from nasal disease.

Redness and Swelling of the Skin of the nose, and the adjacent parts of the face, is a reflex vaso-motor phenomenon sometimes observed. At times it is a mere transitory hyperæmia, and may be confined to the tip of the nose. In other cases there is considerable œdematous swelling, as well as redness, and this may supervene in acute attacks resembling erysipelas. Permanent redness, and infiltration of the skin, may result from repeated attacks.

Headache, Migraine, and Neuralgia of the Trigemini are not uncommon reflex nasal neuroses. The headaches may occur as frontal or occipital pains, or as a dull pressure on the vertex. Typical neuralgia is most frequently seated in the supra-orbital branch of the fifth, but may attack the infra-orbital or dental branch. A relationship between typical migraine, paroxysmal sneezing, and asthma has long been recognized.

Vertigo, Epilepsy, Facial Spasm, Chorea, Nightmare, and other neuroses, have been ascribed to intra-nasal irritation, and cases have been reported of their relief by appropriate treatment directed to the nose.

Paræsthesiæ of the Pharynx.—Various disturbances of sensation in the throat, such as a feeling of a foreign body, or of fulness, tightness, or constriction of the throat, or a feeling of constantly wanting to swallow, may depend upon pathological conditions of the nose. These feelings often arise from pathological conditions of the pharynx itself, or of the follicles at the base of the tongue; but in other cases they depend upon intra-nasal affections, and only yield to treatment of such affections. It may be a question whether we should speak of these cases as instances of reflex neuroses, or rather of a difficulty, on the part of the patient, of localizing sensations (*Schadewalt*).

Diagnosis.—The various affections above enumerated, and still others not mentioned, have, in the judgment of competent observers, been more or less frequently found to

have arisen as results of intra-nasal irritation. In some instances, these affections may depend on nasal disease without having been in any sense reflexly excited. Thus supra-orbital neuralgia, occurring in connection with acute nasal catarrh, may be due to extension of inflammatory swelling to the frontal sinus, and thence to the sheath of the nerve. Cough may result from the trickling back of mucus on the larynx, especially in the recumbent position. Giddiness may arise from a secondary affection of the ear.

How do we arrive at the suspicion that a given neurosis is of nasal origin? In the first place, the coexistence of some chronic nasal trouble may be known, and the knowledge that the neurosis in question has sometimes a reflex nasal origin will lead us to direct our attention to the nose as the possible cause. Then, again, some of these affections, such as periodic coryza and paroxysmal sneezing, have a more obvious connection with the nose, and our attention should, in the case of these complaints, be directed to the nose from the first. In other diseases, such as asthma, migraine, paroxysmal cough, etc., certain symptoms may be present during the attack, or in the intervals, which may excite suspicion of a nasal origin. A careful inquiry into the history will often reveal such symptoms, although at the onset of our inquiries the patient may declare that he has never suffered from the nose. Transitory attacks of nasal obstruction, attacks of sneezing, and watery discharge from the nose, are the symptoms we should especially look for. Patients attribute little importance to them, and they may have existed in times gone by, during the early period of the neurosis, and have passed out of recollection until questioned on the point. Sometimes patients complain of an itching or creeping in the nose, or a feeling of pressure at the root of the nose, and such feelings may be especially noticed before the onset of the attack. Sometimes little or nothing may be obtained from the history given by the patient, and the suspicion may

arise from the failure of all the ordinary methods of treatment, and from the knowledge that the trouble in question does unquestionably arise, in some cases, from nasal disease.

Whenever the suspicion thus arises that a complaint is of nasal origin, the case should, as far as possible, be put to further proof. A careful examination of the nose is a rational proceeding in such a case, since it is well established that various pathological reflexes may originate from the nose. The mere discovery of some nasal trouble, such as a polypus, a hypertrophy or septal deformity, does not of course justify the conclusion that we have arrived at the cause of the trouble. Mechanical irritation with the probe may discover hyperæsthetic areas in the mucous membrane, and if, as is not unfrequently the case, such irritation evokes symptoms of the malady from which the patient is suffering, whether coryza, cough, asthmatic symptoms, cephalalgia, or otherwise, this affords a presumption that the patient's trouble is of nasal origin.

Cocaine is sometimes a most valuable aid to the diagnosis of reflex nasal neuroses. If we can, by the application of cocaine to the interior of the nose, relieve or cut short an attack, we have very strong evidence of the nasal origin of the neurosis. A ten or twenty per cent. solution should be applied, and in the case of a one-sided neurosis, such as supra-orbital neuralgia, we choose the corresponding side; in other cases we select, first, the side in which the more marked morbid changes are present, and after a quarter of an hour or so, if there is no result, we repeat the application on the other side, or we may simultaneously anaesthetize both cavities. If there is no result, the probability that the neurosis is of nasal origin is much diminished.

In some cases a very exact experiment may be performed. Irritation with a probe at some particular spot may set up symptoms of the neurosis, and subsequent careful anaesthetization of this spot with cocaine may allay the symptoms in the course of five or ten minutes.

In obscure cases we may have to rely on the effects of treatment as the only means of establishing a connection between the nose and a coexisting malady. We should of course the more readily engage in local treatment if the nasal condition were one which on other grounds called for treatment. If treatment of the nose were followed by amelioration or cure of the coexisting trouble, it would afford strong grounds for accepting a connection between the two. Yet, even in this case, the proof would be by no means absolute. It is well known that functional disturbances are sometimes relieved by strong impressions conveyed from regions unconnected with the cause of these disturbances; and, moreover, we have to take into account the important part which suggestion plays in the cure of various functional neuroses. It must be further remarked that certain ailments which, by treatment or otherwise, have been shown to be probably dependent on nasal disease, are not necessarily to be classed among the reflex neuroses. In many instances we have to deal with the results of mechanical pressure, of extension of inflammation, of circulatory disturbances, etc.

Treatment.—Many remedies for the relief of periodic coryza, or paroxysmal sneezing, will be mentioned in the section dealing with that common form of the malady known as hay-fever. In treating the various reflex nasal neuroses, our success must depend, in the first place, and principally, on the correctness of our diagnosis in assigning a nasal origin to the disease in question; and, in the next place, on the judgment, patience, and thoroughness with which we carry out the local treatment.

The local treatment consists, in the first place, in the removal of such pathological conditions as may be supposed to have contributed to the production of a hyperæsthetic state of the mucous membrane; and, in the second place, in certain cases, in the destruction of excessively hyperæsthetic areas in the mucous membrane, more especially, of course, such as, when

irritated with a probe, give rise to the morbid reflex symptoms. Polypi must be removed. Marked erectile swellings are to be reduced, in the manner described in the section on chronic nasal catarrh, the galvano-cautery being here probably the most serviceable means at our disposal. Hyperplastic conditions of the inferior or middle turbinal must be treated in an appropriate manner. Sometimes removal of a portion, or the whole of the inferior turbinal is indicated (see p. 130). Prominent ridges and spurs on the septum, if they are in contact with the turbinated bodies, should be removed, procedure generally best effected by means of the nasal saw. Hyperæsthetic areas are best treated with the galvano-cautery, although the application of chromic or trichloroacetic acid will often serve the purpose. Other diseases or abnormalities may be treated in the manner described in the various sections of this work.

In some cases we may expect in this manner to effect a complete and permanent cure of the neurosis. In other cases we only succeed in alleviating the symptoms without completely curing them. In other cases, again, after marked improvement or cure has been obtained, we are disappointed to find that, in course of a longer or shorter time, a relapse occurs. In the latter case, renewed nasal treatment may again effect a cure.

The permanence and completeness of our cure will be aided by attention to the general condition of the patient. A general neurasthenic condition may be present which will call for treatment with nervine or other tonics, as well as suitable hygienic and moral treatment. But it stands to reason that such a neurasthenic condition does not contra-indicate intranasal treatment. On the contrary, its presence is an additional reason for using every endeavour to mitigate the neurosis of nasal origin as speedily as possible.

XII. HAY-FEVER (**Hay-Asthma**).

Causation and Nature.—Hay-fever is a peculiar affection of the air passages, which attacks predisposed persons at a certain period of the year. The affection is characterized by irritation, vascular congestion, and increased secretion of the nasal and conjunctival mucous membrane, and, it may be, of more or less of the whole respiratory tract, down to the smallest bronchi. Sometimes definite attacks of bronchial asthma supervene.

The affection prevails in this country, as well as in France and Germany and other European countries, in the late spring and early summer. The attack does not usually begin till after the middle of May, and usually ceases in the first or second week in July. In the United States two seasonal varieties prevail; one occurring about the same time of year as in England (June cold, rose cold), the other in the early autumn (autumnal catarrh), from the middle of August to the end of September. The disease is said to be of more frequent occurrence in England and the United States than in other countries. In America, negroes and Indians are said to scarcely ever suffer from the complaint.

The predisposition to hay-fever is often inherited. Cases are common where several members of a family are subject to it, and sometimes it has been traced through several generations. It is more frequent in the male sex, in the proportion of about three to two. As to age, the liability of the disease appears to be greatest between twenty and forty. It sometimes begins in early childhood, and rarely appears for the first time after forty.

The disease occurs much more frequently among persons of the educated class, and those who do brain work, than among the lower classes, and such as earn their living by manual labour. Dwellers in cities are more prone to the disease than country people; the agricultural labourer, who must be supposed to be the most exposed to its influence, being perhaps, of all persons, the least affected. This incidence of the disease, on persons of a particular mode of life, is intimately associated with the fact that the nervous temperament is undoubtedly a powerful predisposing cause. A neurotic inheritance is in many cases indicated by the existence of neuroses, such as hysteria, epilepsy, etc., in the family.

Much discussion has taken place as to the exciting cause, or causes, of hay-fever. Some of this might have been spared, if there had been a clear understanding as to what the term hay-fever was intended to designate. I think, if the term is to be retained at all—and it would be hard to get rid of it—it is best reserved for the coryza, with other associated symptoms, which periodically recurs, in certain people, at the particular seasons of the year above mentioned. Now it is clear that at the season in which hay-fever, in this sense of the word, prevails, there is some widely-spread influence at work, and the question is, what is the nature of this widely-spread influence?

It is well known that various exciting causes will set up paroxysms of coryza, etc., exactly resembling hay-fever, in certain individuals, at any season of the year (see p. 177). Of all these various causes, the application of pollen to the nasal mucous membrane is the most frequent and the most active. During the hay-fever season the local irritants, contained in the summer air and summer dust, are no doubt numerous; but it is certain, as the result of many observations and experiments, that pollen is that which irritates most. Blackley's* experiments show beyond doubt that the hay-

* "Hay-Fever." London, Second Edition, 1880.

fever which occurs in this country is due more especially to the contact with the nasal mucous membrane, and to some extent with the conjunctiva, of the pollen of flowering grasses and cereals which blossom at this time of year; and, moreover, that the rise and progress and fluctuations of the malady, during its season of prevalence, correspond with the varying amount of pollen in the air at the time. It has been proved that, among the grasses, those most productive of hay-fever are the sweet-scented vernal grass (*Anthoxanthum odoratum*), the rye-grass (*Lolium perenne*), and the sweet-scented soft grass (*Holcus odoratus*). It has been shown, too, that the fresh plant is less powerful than the hay made from these grasses. It seems, too, that grasses have a larger part in the production of hay-fever in England than in America. There, the researches of Marsh, Wyman, and others have shown that the pollen of the *Ambrosia artemisiifolia*, or Roman wormwood, or rag-weed, as it is commonly called, plays the most important part in the production of the autumnal variety. The rose also appears to be more potent in producing symptoms in America (rose cold) than in this country.

It may be considered as established that it is the widely-diffused presence of pollen in the air, at certain seasons, which causes the annually-recurring malady known as hay-fever. Nevertheless, it must be thoroughly understood that hay-fever is merely a particular instance of that large group of cases already referred to (p. 177), in which vaso-motor and secretory disturbances, in some part or the whole of the naso-bronchial tract, occur in connection with a variety of exciting causes, of which pollen is one. The terms nervous coryza, vaso-motor coryza, or paroxysmal sneezing, may be conveniently applied to these cases of recurring attacks of coryza, and the name hay-fever may be retained for the annually-recurring pollen-produced variety, it being understood that hay is only one, and in this country the commonest, cause.

It is doubtful whether dust, sunshine and heat, and other

things which have been suggested as exciting causes, can be considered as more than accessory or aggravating influences in hay-fever. Aggravating influences they no doubt are, for it will be found that the majority of the subjects of hay-fever are liable to attacks of sneezing, coryza, etc., at all times of the year, from such causes as dust of any kind, in- or out-door, sudden exposure to sunlight, and various other influences.

The important question as to how far intra-nasal disease enters into the causation of hay-fever remains to be considered. Little attention was paid to this question till of late years. In consequence, however, of the labours of Daly, Roe, Hack, Herzog, Sommerbrodt, Bosworth, and many others, it has been established that hay-fever, as well as the allied forms of paroxysmal coryza, is in a large number of cases associated with some abnormal condition of the intra-nasal structures, and that improvement or complete cure of the complaint can often be obtained by treatment of such condition. Among the diseases and abnormalities which have been observed in association with hay-fever may be enumerated marked deviations of, or outgrowths from, the nasal septum, hypertrophic rhinitis, enlargement of the inferior or middle turbinated bodies, mucous polypi, and marked turgescence of the cavernous tissue on the inferior turbinated body. Excessive hyperæsthesia of the nasal mucous membrane, either over a limited area, or more or less generally, is often present.

The manner in which pathological conditions of the nose may be supposed to give rise to the morbid predisposition underlying hay-fever has been referred to in the section on reflex nasal neuroses. It seems probable that pathological conditions may, by long-continued irritation of the sensory nerve-endings in the nose, bring about a hyperæsthesia of the nasal mucous membrane, as well as a morbid excitability of certain nerve centres, even if none existed at the outset. An irritant will then affect this hyperæsthetic area, which in the healthy condition would be insufficient to produce

any effect. The first reflex symptoms will generally be experienced in vaso-motor and secretory disturbance of the nasal passages; but, by-and-by, other associated centres will be involved, and a train of reflex symptoms will occur in the whole naso-bronchial tract. It is, moreover, obvious that intra-nasal irritation will set up reflex symptoms in certain persons more readily than in others, and that a nervous temperament is an important determining influence. Since, too, it cannot be denied that hay-fever occurs apart from pathological conditions of the nose, it may be right in some cases to regard it, so to speak, as an independent neurosis, manifesting itself by a peculiar hyperæsthesia of the nasal and, it may be, of the ocular mucous membrane, or by a morbid excitability of certain nerve centres, or by both of these conditions.

Symptoms and Course.—The earliest symptoms of hay-fever are, usually, an itching sensation in the roof of the mouth and on the palate, or itching and burning at the inner canthi of the eyes. Irritation inside the nose is also experienced, and very shortly paroxysms of sneezing set in. The nose soon becomes stuffy and obstructed, and runs with a clear watery discharge, especially copious after the attacks of sneezing. Pain in the eyeballs and in the frontal region is often complained of. These symptoms may take several days to fully develop, and they are apt to be more marked in the mornings, giving the attack an intermittent character.

After some days the symptoms become more persistent and severe. The nostrils are completely occluded, compelling the patient to breathe through the mouth, and the paroxysms of sneezing are extremely violent. The obstructed condition of the nostrils is subject to rapid changes, and in lying down the undermost nostril is often the more obstructed, apparently from gravitation of blood and serous effusion. The conjunctivæ become congested and red, profuse lachrymation occurs, and the lids are often œdematous. The whole face, in severe cases, is red and swollen. The mucous membrane of the mouth,

pharynx, and tonsils partakes of the irritation, and becomes more or less red. The senses of taste and smell are impaired, and sometimes there is partial deafness.

During the course of the attack the patient complains of some lassitude and weakness, and there is generally an incapacity for intellectual work. Slight feelings of chilliness are common, and a little pyrexia may occasionally be present during some part of the attack; but, as a rule, there is no increase in either pulse or temperature. Itching of the skin of the scalp, face, chest, and shoulders is common, and sometimes an urticarial eruption is present.

In many cases, and especially in persons who have had attacks several times previously, catarrhal symptoms in the lower respiratory tract supervene on the coryzal symptoms. A short dry cough, and some tightness of the chest may be present, attended with an expectoration which is at first thick and scanty, and later on becomes more profuse. Sometimes definite attacks of bronchial asthma occur, exactly like attacks unconnected with hay-fever, and, like these, they occur more frequently at night. In some persons, especially in those who have suffered for several years, the coryzal symptoms give place almost entirely to asthmatic symptoms, and sometimes the two sets of symptoms seem to alternate.

After the symptoms have existed for three or four weeks, sometimes longer, sometimes shorter, they gradually subside. The course of the case is of a more or less remittent character throughout, and is influenced by the locality in which the patient happens to reside. The severity, duration, and special localization of symptoms vary much in different individuals, and to some extent in the same individual, in successive years.

Once a person is affected with hay-fever he may be expected to have it every year, unless he happens to remove to a suitable locality during the season. It may continue to an advanced age; but probably the majority of people lose the susceptibility to it somewhere about forty or fifty years of age.

Some hay-fever patients become subject to asthmatic attacks at other periods of the year than the hay-fever season, and these persons may develop in time into confirmed asthmatics. Conversely, it will be found by careful inquiry into the history of asthmatic people, that a goodly number of them suffer, or have in former times suffered, either from hay-fever or from some allied form of paroxysmal coryza.

Treatment.—Persons subject to hay-fever may, if circumstances permit, endeavour to secure exemption from the malady by a change of residence during the hay-fever season. A sea voyage is the most effectual method of securing exemption. A change to the seaside generally gives relief, especially if a situation can be selected backed by high cliffs, and where the prevailing winds are from the sea. The centre of a large town is preferable to a country residence.

Patients suffering from hay-fever get relief by staying indoors as much as possible during the hay-fever season, as thereby they avoid to some extent the specific irritant (pollen), as well as the aggravating influences of light, heat, and dust. The proximity of hay-fields should of course be avoided. Cotton-wool plugs for the nostrils, and spectacles with accurately-fitting gauze guards, have been found to afford to the wearer considerable immunity from the complaint.

Many internal remedies have been recommended. As a general rule these patients exhibit some degree of nervous irritability, or neurasthenia, which requires to be treated on the usual lines. Apart from this, however, certain drugs have acquired more or less reputation in the treatment of hay-fever. Quinine is sometimes useful. It should be given in full doses, and, if possible, should be commenced before the attack, and continued till near its close. Arsenic is also useful, and is best given in full doses of the liquor sodæ arseniatis, before and during the attack. Antipyrine has recently been well spoken of. Iodide of arsenic, valerianate and phosphide of zinc, belladonna, nux vomica, bromide, and iodide of potassium have

been found of service in different cases. I am in the habit of trusting mainly to quinine, arsenic, belladonna, and iodides as internal remedies for the treatment of hay-fever and allied forms of paroxysmal coryza. I have found a pill containing quinine gr. iss, iodide of arsenic gr. $\frac{1}{24}$, extract of belladonna gr. $\frac{1}{12}$, administered three times a day, very useful in hay-fever, paroxysmal sneezing, and other allied affections.

Morell Mackenzie recommends five or six drops of tincture of opium twice a day, as being effectual in diminishing sneezing and reducing secretion. Hypodermic injections of morphia, administered daily, will give relief to all the symptoms of hay-fever, and will, indeed, sometimes afford complete immunity from the malady; but, of course, it is a line of treatment not to be lightly entered upon. Recently, suprarenal gland substance, administered in full doses, has been recommended for hay-fever.

When asthmatic symptoms predominate in the attack, the administration of ten grains of iodide of potassium, with four or five drops of liquor sodæ arseniatis, three times a day, will sometimes give speedy relief. All the ordinary asthmatic palliatives, such as nitre fumes, medicated cigarettes, Himrod's powder, etc., will be found more or less serviceable in hay-asthma.

Inflammations and excoriations of the lips and margins of the nostrils may be treated with bland ointments, such as those containing subnitrate of bismuth or oxide of zinc. The itching and burning of the eyes are sometimes relieved by the application of very mild astringent lotions, containing acetate of lead or sulphate of zinc. A drop of a two or four per cent. solution of hydrochlorate of cocaine, placed in the eye, relieves the burning and itching in a rapid and remarkable manner, but the effect usually soon passes off.

Many different remedies have been employed for direct application to the nasal passages in hay-fever. Cocaine, having a benumbing effect on the terminal sensory nerve

filaments, and a decided power of producing ischæmia, might be expected to relieve the symptoms. A spray containing a four per cent. solution of hydrochlorate of cocaine, or, still better, the direct application of cotton wool soaked in a stronger solution, will be found to afford immediate relief. Occasionally the relief will be found to last a considerable time, perhaps for the remainder of the day. More often, however, the effect is transitory, and the application needs frequent repetition. It is doubtful whether such frequent repetition does not, in the end, lead to a greater tendency to vascular dilatation, and increased irritability. Moreover, toxic effects may be set up in certain individuals by the frequent application of the drug. Hence menthol, which has a somewhat similar action on the mucous membrane to cocaine, is recommended as a better application. A one to five per cent. solution in liquid paraffin may be painted or sprayed on the mucous membrane, or a little cotton-wool, soaked in an oily solution, may be inserted into the nostrils. It must be confessed, however, that menthol is far inferior to cocaine in the relief afforded, and its application sometimes causes pain and smarting, which is never the case with cocaine. The local application of a solution of suprarenal gland substance is also a useful remedy.

The most important thing, however, in every case of hay-fever, is to make a careful examination of the nasal passages, so as to undertake the treatment of the pathological conditions, which, as already stated, are very frequently found associated with the malady, and the removal of which may eradicate or greatly mitigate the complaint. Mucous polypi, if present, must be removed. Erectile swellings should be reduced with the galvano-cautery. Hypertrophic rhinitis should be dealt with by means of the cautery or snare as the case may be. In cases of extensive hypertrophy of the inferior turbinal tissues, especially in narrow nasal passages, the complete removal of the turbinals is often the best treatment. **Marked**

deviations of the septum may have to be corrected, and septal outgrowths which impinge upon the turbinated bodies should be removed. By pursuing this plan of treatment the best results have been obtained in the direction of a radical cure. It may be undertaken during an attack, but is best pursued during the interval of freedom, and the patient must be kept in sight till the next season, so as to discover what benefit has been derived, and whether further local treatment is required.

Intra-nasal treatment is not necessarily to be discarded from consideration because no gross pathological changes are present, for, since the attack is immediately determined by the application of an irritant (pollen) to the nasal mucous membrane, any treatment which has been found to destroy the irritability of the mucous membrane, such as the destruction of hyperæsthetic areas with the galvano-cautery, is rational. Moreover, measures which effect a permanent constriction of the cavernous tissue on the inferior turbinated bodies will tend to eliminate one element in the production of symptoms, and will mitigate the severity of the attack, though the susceptibility to the complaint may remain.

It must be remembered that even where local treatment is most strongly indicated, a prolonged course of general treatment with nervine and other tonics may be desirable.

XIII. PROFUSE WATERY DISCHARGE FROM THE NOSE (*Rhinorrhœa*).

CASES are met with from time to time in which the prominent symptom is a profuse thin discharge from the nose, from one or both nostrils. The majority of such cases are distinctly allied to the nervous coryza already described at p. 176, the watery discharge being, however, out of proportion to any other symptom that may be present. The discharge in such cases occurs more or less periodically, every day, or it may be several times a day, and is ushered in by some frontal or supra-orbital pain, or a sense of formication across the bridge of the nose, or some irritation in the nose followed by fits of sneezing. Sometimes the discharge commences without any such premonitory symptoms. Some exciting cause, such as a draught of cold air, a sudden change of temperature, inhalation of dusty atmosphere, etc., is often observed to produce or aggravate the attack.

The discharge in these cases may run in drops, or even in a stream from the nose, usually from both nostrils, for several hours. In some cases the discharge has continued for days or weeks, almost continually, though with remissions and exacerbations. The malady may thus persist in a more or less aggravated form for months or years. It may cease suddenly without apparent cause, and occur again after a variable interval.

It is clear that cases of this sort are allied to periodic coryza and hay-fever, the secretory disturbances being, however, much more marked than other symptoms, and every gradation is to be met with between the severest case of rhinorrhœa and

an ordinary case of the class of nervous coryza, or paroxysmal sneezing. In a case reported by Althans, a very profuse acrid discharge from the nostrils was consequent on complete paralysis of the fifth nerve on each side; and in this case the flow may have resulted from a withdrawal of the inhibitory action of this nerve on the secretive function of the nasal mucous membrane.

Many cases have been recorded, however, of more or less profuse watery discharge from the nose, almost invariably from one nostril only, which do not seem to be allied in their nature and etiology to any of the preceding class of cases. Some of these cases followed a head injury, and a fracture of the cribriform plate or base of the skull, with escape of subarachnoid fluid, seems the most probable explanation. In one case reported by Vieusse,* in which there was a watery discharge from the left nostril and left ear, the existence of a fracture was verified *post-mortem*. In Tillaux's case,† the discharge followed upon an operation for nasal polypi. The fluid only came away in certain positions of the head, ceasing altogether in the recumbent position, and an analysis which was made proved it to be identical with cerebro-spinal fluid. Tillaux believed that the cribriform plate had been injured in the operation. In Mathiesen's ‡ case, which followed a head injury, the source of the fluid was probably the same.

In many other cases the nature of this disease is very obscure; but it appears certain that, in some of them at least, there was a discharge of cerebro-spinal fluid. The discharge in these instances took place from one nostril only, and is described as being clear and colourless, except in one case, Fischer's,§ in which it is described as milky. The quantity varied in different instances, amounting in one case, Elliotson's,||

* *Gaz. Hebd. de Méd. et. Chir.*, 1879, No. 19.

† "Traité d'Anat. Topog.," 1877, p. 56.

‡ Ref. in "Annales des Mal. de l'oreille, etc.," Nov. 1888.

§ *Deuts. Zeitsch., f. Chir.*, 1880, p. 369.1

|| *Med. Times and Gazette*, Sept., 1857.

to two or three quarts a day. In most of the cases there were more or less marked cerebral symptoms at one time or other. In some cases symptoms of cerebral compression were visible at the onset, and were relieved when the flow commenced, to recur again when the flow temporarily ceased. Headache, drowsiness, vomiting, or convulsive symptoms are frequently mentioned as accompanying a diminution or cessation of the flow. In some cases, such as Priestley Smith's,* Nettleship's,† and Leber's,‡ optic neuritis, usually double, and going on sometimes to total blindness, was present. In J. W. Mackenzie's § case there was double optic atrophy. In this case total loss of sight, together with headache and fits of unconsciousness, preceded the nasal discharge for a year. On the appearance of profuse watery discharge from the left nostril the fits ceased, and did not return. Anosmia was noted in Nettleship's and Leber's cases. Death occurred with cerebral symptoms in several of the recorded cases.

The nature of these cases must at present remain uncertain. The frequency of cerebral and other nerve symptoms has probably an important bearing on their etiology. In one of Priestley Smith's cases there was a polypus in the corresponding fossa, and in Paget's || case mucous polypi were found, *post-mortem*, in the corresponding antrum. It is hard to imagine that the polypi could in either of these cases have been the cause of the watery discharge; and, as Bosworth suggests, they may have rather been the result of the constant flow of watery secretion. Analysis of the fluid in some instances indicated that its origin was nasal rather than subarachnoid. In other cases, however, as in that recently reported by Dr. St. Clair Thomson, ¶ the composition resembled exactly that of

* *Ophthalmic Review*, 1883 (record of two cases).

† *Ibid.* ‡ Gräfe's "Archiv.," xxix. 1, p. 273.

§ Ref. in Semon's "Centralblatt," Aug. 1894, p. 67.

|| *Clinical Society's Transactions*, 1879.

¶ "Proceedings of Laryngol. Soc." London, Nov., 1896.

subarachnoid fluid.* In a case reported by M. Mermod,† in which violent headaches were succeeded by a watery flow from the nostril, the fluid was supposed to proceed from the right frontal sinus. An attempt was made to perforate the floor of the sinus from the nose. The instrument was passed up without resistance. The patient died of meningitis, and at the *post-mortem* it was found that the frontal sinus was completely absent, and a small hole was discovered, a little in front of the cribriform plate, which most probably existed from the first, and through which the cerebro-spinal fluid had escaped.

On the whole, the conclusion cannot be resisted that in some cases of watery discharge from one nostril, we may have to deal with an escape of cerebro-spinal fluid. The channel by which the fluid escapes is not certain, and probably it differs in different cases. Berger and Tyrman‡ think that in some instances the escape may occur through the lymph-sheaths of Axel Key and Retzius, which surround the filaments of the olfactory nerve as they perforate the cribriform plate.

* The fluid was found to be clear and colourless; of low specific gravity (about 1.005), containing a trace of proteid (globulin), but no albumen; and showing no cells or other elements under the microscope. The fluid reduced Fehling's solution. This reducing agent is not sugar, as it does not ferment with yeast.

† *Rev. Méd. de la Suisse Romande*, 1896, No. 3, p. 157.

‡ "Die Krankheiten der Keilbeinhöhle," etc. Wiesbaden, 1886.

XIV. EPISTAXIS.

Causation.—Bleeding from the nose is a symptom of extremely common occurrence. It is very often met with in young persons, about the age of puberty, and more often in boys than in girls. It occurs often enough without assignable cause. As it is the commonest form of hæmorrhage occurring without apparent cause, it is easy to understand that, when there is present an actual morbid tendency to bleed, the bleeding should occur more frequently from the nose than elsewhere. The greater tendency to bleed from the nose, as compared with other mucous membranes, is owing, no doubt, among other things, to the great vascularity of the lining membrane, and to its greater exposure to external and traumatic influences.

The causes of nasal hæmorrhage may be divided into local and general. The local causes include, especially, traumatic causes, blows, injuries, introduction of foreign bodies, and "picking" the nose. Picking the nose generally causes hæmorrhage from the septum, just within the junction of the skin with the mucous membrane. Here some dryness or superficial crusting often leads to the habit of picking, and the frequent picking or forcible detachment of crusts leads to erosion or ulceration. Violent sneezing, or blowing the nose, or sniffing up irritant vapours or particles, will sometimes cause bleeding. It occurs in connection with many local diseases of the nose, such as atrophic rhinitis, diphtheria, simple perforating ulcer of the septum, syphilis, lupus, naso-pharyngeal polypus, malignant disease, etc. Hæmorrhage from the nose is a common symptom of fracture of the base of the skull.

The general causes are mostly of a similar kind to those which tend to cause hæmorrhage from other mucous membranes. In the hæmorrhagic diathesis the nose is the part which most frequently bleeds. Hæmorrhage from the nose is a very constant symptom of leukæmia, and is common in anæmia associated with spleen enlargement, and in anæmic conditions generally. It occurs sometimes in scurvy, and is a frequent symptom of purpura hæmorrhagia. It is not uncommon at the onset, or during the course, of any of the specific fevers, especially of malignant small-pox and relapsing fever. It is met with, as a symptom, in chronic alcoholism, cirrhosis of the liver, chronic Bright's disease, and in the subjects of atheromatous degeneration of vessels. A plethoric condition is sometimes answerable for nose-bleeding, but less often than anæmic states. Any condition which causes venous congestion, such as muscular efforts, cough, especially whooping-cough, diseases of heart or lungs, or pressure on venous trunks by tumours in the neck, may give rise to hæmorrhage from the nose. It is further said to occur, sometimes vicariously, in place of customary hæmorrhages, hæmorrhoidal or menstrual. Finally, habitual epistaxis is apparently hereditary in some families, independently of any general hæmorrhagic diathesis.

Where there is a predisposition to bleed, very slight causes, such as a full meal, the use of spirits or hot drinks, mental excitement or bodily exertion, may give rise to an attack; but as a rule, in predisposed persons, the actual exciting cause of each particular attack cannot be detected. When hæmorrhage occurs from such local causes as blows, injuries, ulcerations, etc., it rarely gives much trouble, unless there is present a morbid predisposition to bleed.

The source of the bleeding is in most cases low down, and near the front. This is clear from the manner in which the blood often spurts out from the nostrils, and the frequency with which hæmorrhage can be controlled by a plug in front. From the existence of the abundant arterio-venous network on the

lower turbinated bodies, some have supposed these to be the most frequent source of hæmorrhage. Nevertheless, where precise observations have been made as to the exact source, the fore part of the septum has, in the vast majority of the cases, been shown to be the site of the bleeding point. The firmness with which the mucous membrane is stretched upon and united with the septum, is less favourable to the contractility of the vessels than is the arrangement on the turbinated bones. A small erosion, a knot of dilated vessels, and occasionally in older subjects a minute aneurysmal dilatation of a vessel, will be found to be the source of bleeding from the fore part of the septum.

Symptoms.—Certain premonitory symptoms are occasionally experienced, such as fulness, stuffiness, or stoppage in the nose, pressure or throbbing in the frontal region, or dizziness. Where such symptoms exist, they abate with the bleeding. More usually no such premonitions are felt, the appearance of the blood dropping from the nose being the first sign. The blood usually comes from one nostril only. In general blood disorders, such as fevers or purpura, it may come from both. It usually comes in drops, rarely in a small stream. Very rarely it comes in jets. The blood is of a bright red colour, and coagulates readily, and plugs of clotted blood are often discharged. As a rule, the bleeding ceases spontaneously in a few minutes, and the quantity lost varies from a drachm, or less, to five or six drachms. On the other hand, bleeding may go on for hours, or days, and large quantities, amounting even to several pounds, may be lost. The cessation of bleeding may take place by simple closure of the openings in the vessels, or it may result from the formation of clots in the nasal cavity. Too early dislodgment of such clots may lead to a repetition of the bleeding. Profuse bleeding may be attended with all the symptoms of rapid loss of blood, such as pallor, weak pulse, ringing in the ears, syncope, etc. Repeated hæmorrhages often lead to marked chronic anæmia.

It must be borne in mind that blood from the nasal cavity, especially from the back part, may pass into the pharynx. Thence it may be swallowed, or pass into the larynx and excite cough. Either of these events is more likely to happen when nasal hæmorrhage occurs during sleep, with the patient lying on his back. The subsequent coughing up, or vomiting of blood, may suggest hæmoptysis, or hæmatemesis, from disease of the lungs or stomach. In free hæmorrhage from one nasal passage, blood may flow from the healthy side, having found its way round the septum, in the naso-pharyngeal space.

There is often difficulty in determining the cause of the bleeding, whether a local or a general cause. In certain cases we may have a combination of the two. While the possibility of some general cause must always be considered, a careful inspection should be made of the nasal cavity in all cases of severe or recurrent hæmorrhage, to detect if any local disease is present. This inspection cannot always be made while hæmorrhage is going on, as the blood obscures the view. It must in that case be deferred to an interval between the attacks. Hæmorrhage frequently recurring from the same nostril is an indication of some local cause. Careful search should especially be made at the fore part of the cartilaginous septum for an erosion, adherent scab, or blood-clot, or knot of dilated or varicose vessels.

In children, blood from the nose sometimes has its source in adenoid vegetations in the naso-pharynx. Bleeding from this source is never large, and more usually it finds its way into the lower pharynx, and thence may be spat up. During sleep, blood-stained mucus will often run from the mouth and stain the pillow in these children.

Treatment.—Hæmorrhage from the nose, in the vast majority of cases, tends to cease spontaneously, without any special treatment, beyond avoidance of such things as might increase the flow, such as stooping the head low down over a basin—a common practice—or blowing the nose. It is well

to place the patient on the side, in the semi-recumbent position, with the head and shoulders raised, and, at the same time, to apply a cold compress to the forehead and nose, or to the nape of the neck. The ala of the nose should meanwhile be pressed firmly against the septum for some minutes. If the bleeding is from the usual situation, viz. the anterior part of the septum, this will directly compress the bleeding-point. In any case, by arresting the flow forwards it tends to promote the formation of a clot in the nose. If the patient is on the side, the blood will not flow back into the throat so readily. Most hæmorrhages will soon cease under this simple treatment.

Elevation of the arms above the head, attempts to produce reflex spasm of the vessels by application of cold to the spine, or to the scrotum in men, or the breasts in women, and derivatives, such as a mustard foot-bath, are recommended as useful, and at all events may be tried in conjunction with the preceding methods of treatment.

The application of cold, or of styptics, to the interior of the nose, is sometimes of service. Injections of cold water, or, better still, of hot water at a temperature of 120°, will sometimes arrest hæmorrhage immediately; but all injections have the disadvantage of washing away the clots as soon as formed. The insertion of a plug of cotton wool soaked in a solution of cocaine hydrochlorate (10 per cent.) or of cocaine hydrochlorate and antipyrine (5 per cent. of each), or in a twelve-volume solution of peroxide of hydrogen, is sometimes effectual. A solution of suprarenal extract applied in a similar manner is also useful. Insufflation of powdered matico, alum, or tannin, has been recommended. The direct application of solid nitrate of silver on the galvano-caustic point to the bleeding spot is the best method, but it is not usually possible to discover the bleeding point while hæmorrhage is going on.

If the bleeding is profuse, a plug must be introduced

through the nostrils, so as to put pressure on the bleeding point, which, as already stated, is usually situated on the fore part of the septum. For this purpose it is best to take a long narrow strip of iodoform gauze of three or four folds, or several shorter strips, and by means of a probe or slender pair of forceps, to thrust the end along the floor of the nose for about an inch and a half, and to firmly pack the anterior part of the nose, in layers, from below upwards. We may, indeed, plug the whole nasal fossa from front to back through the anterior naris. It is obvious that the plug is more likely to be efficacious if it is applied through a nasal speculum by some one accustomed to intra-nasal manipulation. The plug should not be left *in situ* longer than twenty-four hours, as a rule. We must satisfy ourselves, meanwhile, that bleeding does not continue into the pharynx, which may be done by reference to the patient's sensations, or, if necessary, by ocular inspection. If the hæmorrhage has been at all severe, the patient should retain the recumbent or semi-recumbent position for several hours, or a whole day, after the hæmorrhage has ceased. He should be kept free from excitement, and abstain from hot or stimulating drinks.

Many other plans have been suggested for applying pressure to the interior of the nasal cavity. A uterine sponge tent has sometimes been used, but some form of thin india-rubber bag, introduced collapsed, and injected with water or air when *in situ*, has been mostly employed. Dr. Cooper Rose's intra-nasal air plug (Fig. 47) will be found a very serviceable instrument for the purpose.

When other means prove ineffectual, and there arises the



FIG. 47.—Cooper
Rose's Nasal
Air Plug.

slightest danger to the patient from loss of blood, the anterior and posterior nares must be plugged. For this purpose a firm plug of lint or iodoform gauze is fashioned to fit the posterior naris, about an inch and a half long and three-quarters of an inch across. A doubled piece of stout silk, or fine whip-cord is fastened round the middle of the plug, leaving two ends of sufficient length. Another plug is fashioned of sufficient size to block the anterior naris. It is now necessary to get the double string connected with the posterior plug through the nasal passage from behind. A Belloc's canula is often recommended for this purpose, but a thin flexible catheter or bougie is more readily obtained and more easily passed through the nose. The catheter is passed back gently along the floor of the nose, and when it has reached the pharynx the tongue is depressed, and the ends seized with a pair of forceps and drawn out of the mouth. If the catheter at hand is not very thin and flexible, a string can be attached to the end, and this can be seized and brought out through the mouth. In either case the double end attached to the posterior plug can now be made fast and drawn through the nose, and the plug thereby drawn up into the posterior naris, the finger following it and guiding it into position. The two ends are now separated, the anterior plug is placed in position between them, and the ends are then tied firmly over it. The remaining double thread attached to the posterior plug (or one of the threads, the other being cut short) is drawn out of the mouth and fixed to the cheek with a piece of plaster, the object of this being to facilitate removal of the plug. This thread is not necessary, however, and adds somewhat to the discomfort of the patient.

The plugs are left *in situ* from twenty-four to forty-eight hours. It is best not to leave them longer, even though it may be necessary to introduce fresh plugs at the end of that time, as there is danger of septic complications of a local (ear, sinuses, etc.) or general character. It is well not to withdraw

the string from the nose until it is clear whether re-introduction of the plug may be necessary. The posterior plug may be readily removed by traction on the string attached to it, or by pushing it with a probe into the pharynx, where it can be seized with a pair of forceps. After removal of the plugs, the affected nasal cavity should be carefully syringed out with some antiseptic lotion.

Internal remedies are of limited application in epistaxis, but may be administered in cases of prolonged or frequently repeated bleeding. Ergot, gallic acid, acetate of lead, and other hæmostatics may be tried.

Causal indications frequently demand our attention. We are consulted more often on account of frequent recurrence of hæmorrhage, than of the difficulty of arresting an attack. In frequently repeated hæmorrhage, with or without apparent cause, a careful examination of the nasal cavity should always be made. Disease of the nose, such as chronic rhinitis, atrophic rhinitis, or ulceration of some kind, may be present, which requires its own appropriate treatment. Some point may be discovered whence the bleeding obviously comes, which by local treatment may be made to heal up, or to which, during a subsequent attack of hæmorrhage, we may be able to apply, directly, our styptic or pressure. As already mentioned, it is on the fore part of the septum that the signs of the bleeding point are most frequently found. Erosions or ulcers in this region must be treated with suitable ointments. Free application of some simple ointment or vaseline will prevent hard crusts from forming, the picking off of which irritates the ulcer, and re-opens the bleeding point. The surface of the ulcer should be touched, from time to time, with nitrate of silver, to promote healing. The galvanocautery is, however, the most effectual application to small eroded bleeding vessels, or minute telangiectases on the septum or elsewhere.

Anæmic or other morbid blood conditions, obstructive

diseases of the heart, cirrhosis of the liver, etc., may call for treatment. I shall not enter into the question as to what indications may render it undesirable to arrest a nasal hæmorrhage. I do not believe that any of the reported cases of serious results having arisen, from arresting nasal hæmorrhage, will bear investigation, and I do not know of any safe indication for disregarding such hæmorrhages. In some cases the amount is trifling, and rather calls for treatment of the cause. In some conditions there will naturally be more anxiety about a moderate loss of blood than there would be about a larger amount in others. As already stated, the hæmorrhage tends to cease spontaneously, in the majority of cases, without any special treatment; but, from the first, our directions to the patient should be of a kind to favour such cessation, and should it not occur, more active measures should at once be proceeded with.

XV. FOREIGN BODIES IN THE NOSE.

FOREIGN bodies generally gain entrance to the nasal fossæ through the anterior nares. This accident is most frequent in children and insane people. The substances thus introduced are innumerable. Buttons, glass beads, peas, paper pellets are favourite substances with children. More rarely foreign bodies enter the nose through the posterior nares, in vomiting or coughing. Escape of substances into the nose in deglutition occurs in paralysis of the soft palate. Lumbrici, which have got into the stomach, are sometimes expelled through the nose, or even lodge there for a time. In course of time foreign bodies in the nose tend to get more or less coated with lime salts, which are deposited upon them from the nasal secretions (*see* Rhinoliths).

Symptoms.—The symptoms are those of irritation and obstruction, and their degree depends upon the size, shape, and nature of the body. Rarely a foreign body may remain lodged in the nose for a long time without causing any symptoms. Usually, symptoms of local inflammation are soon established. There is more or less discharge of a mucopurulent or purulent character, sometimes sanguineous, and often fetid. The obstruction will depend on the size of the body and the amount of inflammatory swelling. Some bodies, like peas or beans, swell up, or even germinate *in situ*. Neuralgic pains in the nose, cheek, or head are sometimes present. If the body be not removed the symptoms persist for an indefinite time, with exacerbations and remissions, the discharge never entirely ceasing. Cases, however, are on

record of a foreign body having lodged in the nose for many years without giving rise to any appreciable symptoms.

If a clear history be forthcoming of the entry of a foreign body the diagnosis is easy. Often, however, especially in children, there is no such history to be got. A one-sided purulent discharge, in a child, should, however, always suggest the likelihood of a foreign body. This rule is too often forgotten.

On examination with a speculum the mucous membrane may be so congested and swollen as to conceal the foreign body. The secretion, also, may have to be washed or wiped away before a satisfactory examination can be made. Cocaine is very useful in facilitating the necessary examination. Most frequently the foreign body will be found lodged in the inferior meatus just beyond the vestibule. In long-standing cases the body may be surrounded by granulation tissue, and the appearance may at first sight suggest syphilis or cancer. The probe will often be essential in making the diagnosis. In young children in whom a foreign body is suspected, it may be necessary to give chloroform in order to make the necessary examination.

Treatment.—The removal of a foreign body is usually best effected with a fine pair of forceps. A pair of forceps bent at an obtuse angle is the most convenient form. Sometimes a small blunt hook, or a probe bent at the end into a hook, or some kind of spud, is more efficacious, and occasionally it will be found more convenient to slip the loop of a snare round the body. A ten or twenty per cent. solution of cocaine should first be applied to the parts, and the passage cleansed with a probe dressed with cotton-wool. The operation must be conducted with the aid of a nasal speculum and a good illumination, and, to those accustomed to nasal manipulations, will not be a very difficult matter. Sometimes it is recommended to try a stream of water, directed up the unaffected nostril with a syringe or douche, in order to effect removal of

a foreign body. This will generally be successful in removing the body, if not firmly impacted; but, of course, the injection of a forcible stream of water up the nose, especially in the case of a struggling, crying child, is not without danger to the ears. In any case, if a stream of water is used, the intermittent flow from a rubber ball or Higginson's syringe, is safer than the douche in this respect. A foreign body may sometimes be removed by the Politzer's air-bag applied to the opposite nostril. Sometimes it is necessary to push the body back into the naso-pharynx in order to effect the removal. The danger of its dropping into the larynx has probably been much exaggerated, but a finger may be inserted behind the soft palate as a safeguard.

Small children will generally have to be securely held in a nurse's lap with the aid of an assistant. An anæsthetic is, however, often necessary in children for the removal of a foreign body.

Parasites in the Nose.—In tropical countries it sometimes happens that flies of various kinds deposit their ova in the nasal cavity. The species of fly chiefly concerned is the *Lucilia hominivorax*. The ova are quickly hatched, and the maggots make their way into all parts of the cavity, destroying the mucous membrane, and sometimes causing necrosis of bone, and giving rise to serious local and general symptoms. Occasional instances of maggots in the nose have been reported in this country. J. W. Bond* has recorded a case which occurred in this country. In this case, after several weeks of frontal pain and watery discharge from the nostril, four maggots were discharged, which were identified as the larvæ of the *Piophilæ Casei* (Linnæus). The vapour of chloroform, and injection of sublimate and other parasiticide solutions have been employed for this rare affliction.

Earwigs, centipedes, leeches, round worms, and thread worms have been known to invade the nasal passages.

* *Proceedings of the Laryngol. Soc.*, London, March, 1896.

XVI. RHINOLITHS.

RHINOLITHS, or nasal calculi, are of infrequent occurrence. They usually, perhaps always, result from the deposition of mineral salts from the nasal mucus around a nucleus of some sort, whether formed by a foreign body, a blood-clot, or a small mass of retained secretion. The surface is generally rough and mammillated, and the colour greyish or blackish. The consistence is mostly soft and friable, but occasionally it may be somewhat firm and dense. They are usually rounded or oval in shape, and may attain to a considerable size. The chemical composition of rhinoliths, according to Berlioz,* is as follows:—

| | |
|---|--------------------|
| Phosphate of calcium | 48 to 62 per cent. |
| Carbonate of calcium | 10 to 20 „ „ |
| Phosphate of magnesium | 5 to 10 „ „ |
| Organic matter (exclusive of foreign nucleus) | 17 to 18 „ „ |

Unlike foreign bodies, rhinoliths are more frequently seen in adults than in children. I have, however, met with a case in a child of four.

The symptoms are similar to those attending foreign bodies, a purulent, and often fetid, or sanguineous, discharge being the most constant. In some cases, where the calculus has attained large dimensions, considerable erosion or displacement of surrounding parts has been present. Swelling of the external nose and face has also been noticed. The calculus may form in any part of the nasal fossa, but it is usually

* *Arch. Internat. de Laryngol.*, May, 1891.

situated in the inferior meatus, where it can be seen, or can be felt with a probe. A sharp-pointed probe will generally penetrate the surface, a point of distinction from an osteoma, with which it might be confounded.

Treatment consists in removal, which may generally be effected with a pair of slender forceps, unless the calculus has attained a large size. In the latter case it may have to be cut through, or broken up, with a bone forceps. Cocaine should be applied, as in the case of foreign bodies. Extraction will usually be attended with brisk hæmorrhage, which, however, soon ceases. An anæsthetic will sometimes be required, especially in children. Division of the external nose has been resorted to for the extraction of a very large rhinolith.

XVII. DEFORMITIES OF THE SEPTUM.

DEFORMITIES of the septum include not only deviations or deflections of the whole thickness of the septum from the median vertical plane, but also excrescences, cartilaginous or bony, which present themselves on the surface of the septum, and which, indeed, often coexist with deviation.

Nature and Causation.—Deviations of the septum from the median line are of very frequent occurrence. They are most frequent in the cartilage. The anterior part of the vomer is often implicated. The descending plate of the ethmoid, or the anterior part of the maxillary crest may also be deflected. The posterior part of the vomer is practically never involved. Various classifications have been made, depending on the position and form of the deviation, but such classifications are nearly all more ingenious than useful.

The deviation may be situated in the cartilaginous or the bony portion of the septum, and very often both portions are affected. In some cases the bend is rounded or obtuse, in others it is quite sharp and angular. Again, the prominent bulge or angle may have a more or less vertical, or a more or less horizontal direction. The deviation may also be single, or it may be double, the bend in the later case being directed towards one side in front and below, and towards the opposite side further back and higher up, the so-called sigmoid deviation. In all deviations the prominence of the convexity may be much increased by cartilaginous or bony deposits. The anterior extremity of the cartilage is the part chiefly involved in certain cases. The cartilage is here not unfrequently dislocated from

the maxillary crest and anterior nasal spine, and so thickened as to completely obstruct the nostril, or press against the ala nasi and deflect the tip of the nose. In these cases the cartilage often bulges towards the opposite side higher up.

Cartilaginous and bony excrescences (ecchondroses, exostoses) are very frequent on the septum, sometimes on one side only, sometimes on both sides, and occur in the form of more or less elongated ridges, the so-called crests, or less often of conical spurs or spines. They commonly occur along the line of one of the sutures of the septum. The commonest and most marked are those which occur at the junction of the septal cartilage and the vomer, running in a direction upwards and backwards. They also occur in a less marked form at the ethmo-vomerine junction. Ridges are also observed close to and parallel to the floor at the junction of the vomer and palate-plate of the superior maxillary bone. These projections, ridges, or crests, may be bony or cartilaginous in structure, or partly bone, partly cartilage. The base of attachment is usually broad. They may be more or less flattened, and project but little into the fossa, or they may be of a pyramidal form, and the apex may project considerably, and impinge on the inferior or middle turbinated body, dividing the passage into an upper and lower compartment. These bony or cartilaginous outgrowths are often associated with septal deviation, being developed on the convexity of the deviation. The more conical outgrowths, or spurs, are most frequently observed in a typical form in the posterior third of the septum, where they are of bony structure, and the apex of the spur may impinge on the inferior or middle turbinated body.

The causation of deformities of the septum is uncertain, and many fanciful theories have been constructed to account for the deformity. They are extremely rare at birth, and uncommon in children under six or seven years of age. From seven years onward to puberty, deflections, crests, and spurs begin to be commonly met with. The deformities are more

frequent in males than in females. Heredity, no doubt, plays some part in their development. It is quite common to meet with a similar deformity in a parent and one or more children. The most that can be said of many cases is that they are the result of some anomaly of development, but as to the cause we are in the dark. Some cases may probably be connected with an irregular development of the upper jaw and the neighbouring bones. The nasal septum, made up as it is of several parts of unequal strength, and fixed like a prop between the base of the skull above and the arch of the palate below, must be influenced by the growth of the bones around, and by the greater or less development of the antrum of Highmore and the frontal sinuses. Under pressure, the septum will bend in the direction of least resistance. A high-pitched, narrow, palatine arch, encroaching on the vertical growth of the septum, is generally accompanied by septal deviation.

It is beyond doubt, however, that, in a very large proportion—I should prefer to say in the large majority—of cases, whether of simple deviation, or of ecchondrosis, or exostosis, along the sutural lines of the septum, the cause is traumatic. Falls, blows, and injuries, slight or severe, so common in childhood, are undoubtedly the main factor in the causation of these deformities, and the greater prevalence of all these deformities in the male sex is consistent with this view.

Symptoms.—Deviation of the septum is often associated with external signs, such as inclination of the line of the dorsum of the nose to one side, or asymmetry of the two sides of the nose. Sometimes there is merely slight deviation of the tip of the nose, or asymmetry of the nasal orifices. When symptoms result, they are mainly those of nasal stenosis and chronic nasal catarrh. Many septal deformities, especially those of slight degree, produce no symptoms whatever. Nevertheless the symptoms are by no means in constant relation with the degree of deformity. The individual

predisposition, here as elsewhere, plays an important part in the production of various symptoms.

Habitual mouth-breathing, nasal voice, ear troubles, and other results described in the section on nasal obstruction, may be present. The obstruction is liable to variations and remissions depending on the amount of swelling of the soft parts. A deformity which blocks one passage, leaving the other quite free, is sufficient to set up habitual mouth-breathing. Chronic pharyngitis is a frequent result. The symptoms of nasal and post-nasal catarrh, which so often accompany stenosis from septal deviations, result partly from imperfect drainage of secretions, partly from irritation caused by contact of the sentient surfaces of the septum and spongy bones, and partly from the abnormal physical conditions which result from impeded passage of air. Liability to colds in the head is one of the most constant troubles associated with marked septal deviation. Hypertrophic rhinitis is frequently present, and may be more advanced in the side opposite to that encroached upon by the septum. There is no doubt that the prolonged irritation resulting from deflected septum, especially when the projecting part presses on one of the turbinated bodies, sometimes leads to a hyperæsthetic condition of the mucous membrane, which in turn tends, in predisposed subjects, to the development of paroxysmal sneezing, hay-fever, paroxysmal or hacking cough, and other allied phenomena.

Epistaxis is a not unfrequent symptom of deflected or deformed septum, the source of the blood being a little chronic erosion at the anterior part of the cartilaginous septum. These erosions are often situated in a concavity in front of a bend or projection of the cartilage. They appear to arise from the incoming current of air impinging upon this part, depositing thereon particles of dust, and causing dryness of the surface, the projecting portion of the septum partly protecting it from the moist expiratory current. Once formed, the erosion is

kept up by the habit of picking off the dried crusts which form on the surface.

The diagnosis of septal deformities is generally easily made by anterior rhinoscopic examination, aided, if necessary, by the use of the probe. Both sides must be carefully examined. Sometimes we are surprised to find the concavity of a deviation much less marked than the appearance of the convexity would lead us to expect. This is due to the thickening of the septum at the site of the deviation. This is an important point to observe, as it often guides us as to the best method of operating. Seiler has devised an instrument which he terms a septometer, consisting of a pair of calipers, with an index for the purpose of registering the thickness of the tissue grasped. A marked deflection may completely prevent any inspection of the parts beyond. Sometimes a symchia is observed between a convexity of the septum and one of the turbinals. An enlarged middle turbinal is sometimes seen on the side of the concavity of a deviation, pressing upon the septum, and apparently causing the deviation.

Treatment.—Slight deviations and excrescences, leading to no inconvenience, will, of course, need no interference. Where, however, trouble arises from stenosis of one or both passages, or where persistent catarrhal, or it may be reflex, symptoms appear to depend upon the abnormal condition of the septum, the advisability of interference should be considered. In undertaking an operation for septal deformity, it is important to bear in mind the object for which the operation is indicated, whether to establish a freer passage for nasal respiration, or to prevent the contact of a projecting angle with the structures on the outer wall, or for both these objects. Sometimes operative measures on the septum are indicated in order to remedy an external deformity depending upon septal deviation.

It is doubtful whether any appreciable good can be done, in deformity of the septum, by means of frequently repeated

digital pressure, or by bougies, tampons, and other such simple methods, which have been recommended by various authorities. At any rate, I have never succeeded in producing any good results by such means, although I have given them a trial. On the other hand, in some cases we are able to sufficiently relieve the stenosis, or to prevent the contact of a bent septum, or of an excrescence, with the inferior turbinated body, often a source of irritation, without interfering with the septum itself. This may be effected sometimes by the application of the galvano-cautery to the swollen tissues on the inferior turbinated bone. Care must be taken, in using the cautery

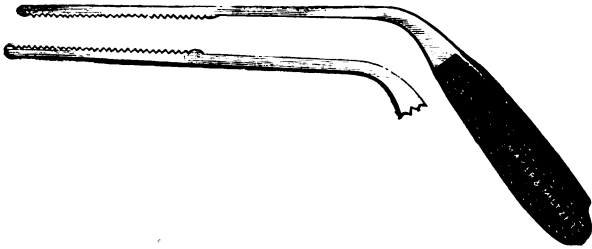


FIG. 48.—Bosworth's Nasal Saw.

in a narrow passage, not to burn both surfaces, and so produce cicatricial adhesion between the two sides. In certain cases the removal of a portion, or even the whole, of the inferior turbinated body, may be the more advisable plan of treatment to adopt for relieving the stenosis resulting from deflected septum.

For the removal of bony and cartilaginous crests, or spurs, whether associated or not with a bend in the septum, various kinds of knives, scissors, cutting forceps, drills, trephines and saws have been devised. Bosworth's nasal saw (Fig. 48) has been much used for this purpose. This instrument has a narrow slender blade, attached to the handle at an obtuse angle, and is used to saw down, vertically, through bone and cartilage, so as to completely remove the whole of the

projecting portion, together with the mucous membrane covering it. A second saw with the edge upwards is made so as to cut from below, in cases where the instrument cannot be introduced above the projecting part. Woakes's nasal saw (Fig. 49) is also a very useful instrument, and serves in most cases as well or better than Bosworth's saw.

When practicable it is well to make an incision over the projecting part, and turn up the mucous membrane with a raspatory before proceeding to remove the excrescences. This, however, is often difficult or impracticable. Dr. Greville Macdonald believes that there is some danger of the patient suffering from "the substitution of a dry cicatrix for the normal secreting membrane." No permanent evil consequences need, however, be feared from the removal of mucous membrane in



FIG. 49.—Woakes's Nasal Saw.

this operation, even of a considerable portion, as is necessary in the cases of larger growths.

A small trephine, worked by an electro-motor on the same principle as the dental engine, is a very useful instrument for the removal of spurs and excrescences on the septum. This method, which was first advocated by Curtis, is very rapid, and not painful, and in certain cases is to be preferred to the saw or any other instrument.

Where the lower edge of the cartilage is displaced from the nasal spine, so as to form a projection into the vestibule, the removal of the prominence is easily effected by reflecting down the skin and removing the projecting part with the knife, scissors, or punch. The removal of this projection is sometimes sufficient to enable a coexisting bend in the cartilage to the opposite side to be corrected, without removing any of the cartilage from the convexity of the bend.

The correction of septal deviations has often been attempted by means of forcible rectification with forceps, followed by the introduction of some form of plug or retentive apparatus. This method is, however, rarely satisfactory, unless some portion of the superfluous structures at the seat of the bend has been removed. After this has been done, Adams's or Walsham's forceps (Fig. 50) may be advantageously employed for restoring the septum to position. Smith's forceps is constructed with a view to fracture the septum by forcing the prominent part through the fenestrated blade, and in certain osseous or osseo-cartilaginous deviations this instrument may be successful

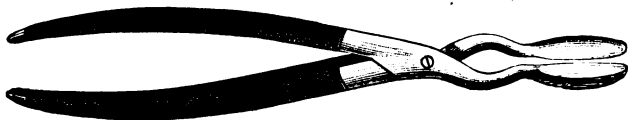


FIG. 50.—Walsham's Septum Forceps.

In purely cartilaginous deviations forcible rectification with forceps is of little or no use.

It may be stated as a general principle that in deviations of the cartilaginous septum some portion of the cartilage at the prominent part of the bend must be removed in order to obtain a satisfactory result. The method by which this is to be done varies with the case, and no general rule of procedure can be laid down. In some cases, owing to the thickening of the cartilage at the convexity of the deviation, the simple removal of this angle with the saw, as above described, will suffice without interfering further with the septum. In many cases some portion of the cartilage, in its whole thickness, must be excised. When the deflection is situated in the vestibule, the skin should be incised and a flap turned off, and the necessary amount of cartilage removed with scissors or punch-forceps. In dealing with deflections situated further in the nasal cavity, the mucous membrane must be incised over

the prominent part, and it may then be separated from the cartilage as far as necessary. The next step must be to separate the cartilage from the mucous membrane of the opposite side. This can be readily done in many cases, as the cartilage will be found to be split at the seat of the bend; but if this is not the case, the cartilage must be incised, taking care not to divide the mucous membrane on the concave surface. The requisite amount of cartilage can be best removed bit by bit with some form of punch forceps (Fig. 51). After removal of sufficient cartilage, the septum is easily restored to position, and a plug of iodoform gauze may be inserted. If, in the

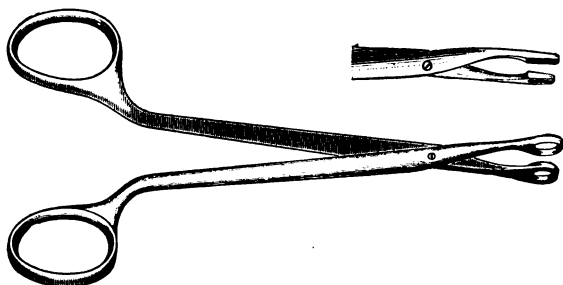


FIG. 51.—Punch Forceps.

subsequent progress of the case, the cut edge of the cartilage tends to project into the passage, it is best to insert a piece of rubber tubing of suitable calibre, which can be worn until healing of the parts has sufficiently advanced.

Instead of removing a portion of the cartilage, some operators practise simple incision of the cartilage at the prominent part so as to overcome its resiliency. The cartilage is then forcibly pushed into position, and retained by suitable plugs. Forceps have also been devised, such as Asch's and Steele's (Fig. 52), for incising the cartilage with the same object.

Electrolysis has been extensively used of late by Moure,

Garel, and others, for the destruction of bony and cartilaginous thickenings, crests, and spurs of the septum. Those who advocate this method represent it as being bloodless and painless, and at the same time very efficacious. I have had no experience of it.

In most operations on the septum pretty sharp hæmorrhage must be looked for, but it usually quickly ceases after the operation. In any case a plug of iodoform gauze will at once control it. This plug should be removed the next day, and, in most cases, no further plug or retentive apparatus is necessary. However, in certain cases when a portion of the cartilage has been removed, and the free edge tends to project into the

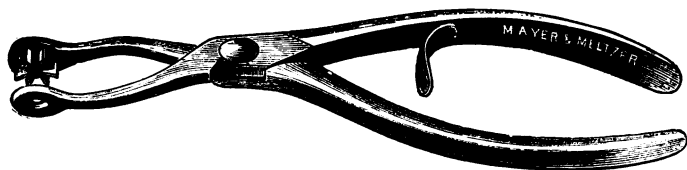


FIG. 52.—Jarvis-Steele Stellate Punch Forceps.

passage, a short piece of rubber tubing of suitable thickness should be inserted, and worn until healing has sufficiently advanced. After operations on the septum the patient should be kept under observation until the wound is nearly or entirely healed. The passage must be kept clean by syringing or otherwise. Sometimes it is useful to keep a little loose plug of gauze applied as a dressing. Antiseptic powders may be insufflated. The after-treatment is in many ways important. It will often be found that, after the operation, some loose tag, or projection, is found, the removal of which will make all the difference between a perfect and an imperfect result. Moreover adhesions are apt to form across the passage, even if no operation has been performed on the turbinal. The tendency to adhesion is so great that one ought never to operate simultaneously on the septum and turbinal bodies. Should a

perforation of the septum be unavoidably made in the operation, no inconvenience need be feared from its presence.

A general anæsthetic will be required for many of these operations on the septum, but the removal of crests and spurs can usually be performed, in tolerant subjects, with the aid of a twenty per cent. solution of cocaine, injected sub-mucously, and painted over the surface.

XVIII. HÆMATOMA OF THE SEPTUM.

EXTRAVASATION of blood beneath the mucous membrane of the septum, forming a blood tumour of variable size, is commonly the result of a blow, or other violent injury, to the nose. As the effusion is generally associated with fracture of the bone or cartilage, the resulting tumour is usually bilateral. The tumour is of a red or purple colour, and can mostly be seen to arise from the fore part of the septum, just within the nostril. It has a soft, fluctuating feel, and is usually pretty symmetrical on the two sides. Fluctuation can often be obtained from one nostril to the other, by using a forefinger in each nostril. The swellings may be so great as to expand the *alæ nasi*, and to protrude like polypi from either nostril. A case which came under my care looked, at first sight, very much like a case of mucous polypus protruding from each nostril, and in fact it had been mistaken for such.

The history of the swellings having followed a blow will generally indicate their nature. Inspection shows them to proceed from the septum by a broad base. The diagnosis from abscess of the septum will be indeed the only real difficulty. A hæmatoma which does not soon subside is apt to pass on to suppuration.

A few cases of spontaneous hæmatoma of the septum, in this case almost invariably unilateral, have been recorded.

Treatment.—Rest, and the early application of evaporating lotions, will generally lead to the gradual dispersion of a hæmatoma. It is not advisable to puncture the tumour, unless the extravasation be very large, and the distension very urgent.

A puncture should then be made in each of the swellings, with the usual antiseptic precautions, and the cavity washed out with sublimate lotion. The fluid injected at one side will be found to pass out through the opening in the other. The nasal passages should then be plugged with iodoform gauze, and the plug changed after forty-eight hours, and afterwards renewed every twenty-four hours until the mucous membrane appears to have reunited to the underlying cartilage. This plan of treatment is preferable to repeated aspiration with a hypodermic syringe, which some authors recommend.

XIX. ABSCESS OF THE SEPTUM.

ABSCESS of the septum may occur acutely or in a chronic form. It is generally the result of an injury. It may result from suppuration of a traumatic hæmatoma, as already mentioned. It may also arise from necrosis of bone or cartilage in syphilitic or tuberculous subjects. Sometimes an abscess of the septum has been observed to occur in the course of a facial erysipelas, or an acute specific fever, such as small-pox or typhoid, etc. In certain cases, which may be designated idiopathic, no distinct cause can be ascribed.

The abscess is usually situated at the fore part of the septum. If it is acute, there may be much local pain, and the nose, and sometimes the cheeks and contiguous parts, become red and swollen. In chronic cases, the onset and progress are insidious, and the local symptoms slight. On examination a fluctuating tumour, usually on both sides of the septum, will be found. Fluctuation can often be obtained from one nostril to the other, owing to a perforation of the cartilaginous septum, the result of the original injury or of the abscess.

The treatment of septal abscess consists in early incision, with usual antiseptic precautions and free drainage. A free incision should be made and not a mere puncture. If the tumour is bilateral, an opening should be made in both sides. In acute abscess the mucous membrane will often heal over the septal perforation, but a permanent opening is likely to result from chronic abscess.

XX. PERFORATING ULCER OF THE SEPTUM.

PERFORATION of the septum nasi is a frequent result of syphilis. Lupus, also, and tuberculous ulceration, may lead to the same condition. Abscess and hæmatoma of the septum may also terminate in a permanent opening. Independently, however, of any of these causes the cartilaginous septum may be perforated by an ulcerative process, which one may term simple perforating ulcer of the septum. This form of ulcer has been recently the subject of a careful study by Hajek,* of Vienna; but Hutchinson † had already called attention to it in 1884, and Voltolini and Zuckerkandl had also described it.

The seat of the ulcer is always the cartilaginous septum. Hajek describes the ulcer as being usually round, less often oval, with the long diameter antero-posteriorly. It may be unilateral or bilateral, and when bilateral the ulcer may commence simultaneously on both sides, or successively on one side and the other. According to Hajek, the disease commences at the surface of the mucous membrane, by the formation of a greyish pseudo-membrane, which separates and leaves a shallow ulcer with clean-cut edge. The ulcerative process extends in depth, and ultimately denudes and then destroys the cartilage. Once the cartilage is denuded the perforation proceeds rapidly, but the earlier stage may extend over a long period. Finally the edges of the perforation cicatrize, but cicatrization is often long delayed. The age in Hajek's cases varied from fifteen

* Virchow's Archiv., B. 120, H. 3, S. 497.

† *Medical Times and Gazette*, July 5, 1884.

to seventy-one years. Men are more often affected than women.

Nothing can be said with certainty as to the cause of the perforating ulcer. It is true that the current of air entering the nostril impinges on the fore part of the cartilaginous septum, and particles of dust and such-like may lodge there, and the irritation therefrom may beget the habit of picking with the finger, by which erosion and superficial ulceration are sometimes caused. Such erosions, or ulcers, are in fact common enough, and are often the source of hæmorrhage; but if they lead to perforation it is only very rarely, and under some exceptional circumstances, and under the influence of some predisposing cause.

The ulcers cause little or no inconvenience, and are quite painless. They may give rise to a habit of picking the sore, and occasional epistaxis may occur. The usual site is just within the nostril, about half an inch above the columna. Often perforation has already taken place, when the lesion is discovered, without any definite history to show how long it has existed. The ulcer, or perforation, measures usually about half an inch in diameter. The edge of the perforation may be ulcerated over a greater or less extent, or it may be already wholly healed at the time of its discovery. While the edge remains unhealed it is apt to be the seat of a troublesome accumulation of crusts, which are discharged from time to time, often with a certain amount of blood. The bony septum is never involved, in contrast with syphilitic ulceration, from which the disease in question is further distinguished by the less rapid course, the absence of fetor, and the general history.

The treatment consists in endeavouring to arrest the ulceration and bring about cicatrization, whether perforation has already occurred or not. The parts should be kept cleansed of crusts and secretion, and the ulcerated surface should be treated with some caustic application. Nitrate of silver,

the acid pernitrate of mercury, and the galvano-cautery have all been found useful. Scraping with a curette is often the best treatment when the edges of the perforation refuse to heal. Dilute nitrate of mercury or iodoform ointment may be used as a dressing for the sore.

Workers engaged in the manufacture of chromic acid and its salts* are liable to a peculiar perforating ulcer of the cartilaginous septum, caused by the local action of the vapours or dust of these substances. It is said that upwards of fifty per cent. of the workers suffer in this way. The symptoms attending this affection are more or less irritation, sneezing, and watery discharge in the early stage, and later, a discharge containing crusts, and sometimes blood, but never offensive, in character.

Symmetrical ulcers, with greyish-white bases, form on each side of the cartilaginous septum. In the course of some months or a year, a small perforation takes place, and the hole rapidly enlarges to the size of the ulcer, and then stops. These holes may occupy a greater or less extent of the cartilaginous septum, but never invade the bony septum or the columna. The process is unattended with pain. No deformity of the external nose results. Those who are affected with perforation are said not to suffer subsequently from nasal catarrh, to which their occupation previously rendered them subject.

Workers in arsenic sometimes suffer from similar perforations of the septum.

Cement† workers are said sometimes to suffer from perforating ulcer of the cartilaginous septum. This is probably due to irritation caused by the dry cement dust which is drawn into the nostrils, and to the habit of picking the nose which is thereby caused.

* Chevallier and Bécourt, *Ann. d'Hygiène*, July, 1863; Richardson, *Lancet*, March 11, 1882; Pye, *Ann. of Surgery*, 1885.

† Foulerton, *Lancet*, August 17, 1889.

XXI. MORBID GROWTHS IN THE NOSE, AND NASO-PHARYNX.

THE commonest morbid growth in the nasal passages is the ordinary soft, gelatinous polypus, or mucous polypus, to which the term "nasal polypus" is now generally confined. Much more rarely growths of the nature of papillomata, fibromata, sarcomata, and carcinomata are met with, as well as those of a cartilaginous and osseous character. The ordinary mucous polypus, occurring as it does more frequently than all the other morbid growths put together, is the only one that will need detailed description.

1. MUCOUS POLYPI.

Causation and Nature.—Mucous polypi are more common in men than women. They occur chiefly in young adult life, being rarely met with before the age of fifteen, and not often beginning in advanced life. The causation of these growths is doubtful. There is, undoubtedly, an inherited predisposition in some cases. One often meets with instances of polypi occurring in several members of the same family. Repeated inflammatory attacks, and chronic nasal catarrh, tend to their development. They not unfrequently develop in persons subject to nervous coryza or paroxysmal sneezing, and when they develop in these subjects they usually aggravate the symptoms. They are very often associated with inflammatory and hypertrophic conditions of the middle turbinated body and other parts of the ethmoid bone, and with suppuration

in the ethmoidal cells, and other accessory cavities. Woakes holds that polypi result from a chronic inflammatory process of the muco-periosteal investment of the spongy bones, associated with a morbid condition of the bone itself closely allied to caries, which he terms *necrosing ethmoiditis*. This view, however, has not received support from other quarters. It is admitted that in many cases of mucous polypus, especially in extensive and obstinate cases, inflammatory changes are present in the middle turbinal and other parts of the ethmoid bones, with or without suppuration in the ethmoidal cells. It is not, however, certain where the primary trouble is situated which leads to the growth of polypi. Lack* maintains that in every case of polypus bone-change is present of the nature of rarefying osteitis, and that this is the primary cause of the growth of polypi. Others regard the inflammatory changes in the mucous membrane as the essential cause of these growths, and the bone changes, when present, as being, in most cases, secondary to the disease of the mucous membrane.

Nasal polypi are usually multiple, and are found simultaneously in both nasal fossæ, in about half the cases met with. They vary in size from a grain of wheat to a grape, but may attain the size of a chestnut, or even greater dimensions. They are of a pearly grey, or greyish-yellow colour, and have a smooth, glistening, translucent appearance. They are of soft consistence, and if cut across a quantity of thin fluid oozes out, by which the size is much reduced. They are globular or pyriform in shape, and usually hang loosely from the nasal wall, being attached thereto by a narrow pedicle. Some are, however, sessile, and attached by a more or less broad base. As they increase in size they are moulded by the surrounding parts, and may assume very elongated or flattened forms.

Mucous polypi grow from the mucous membrane, and are composed of the elements of the mucous membrane more or

* *Proceedings of Laryngological Society of London*, 1901, p. 19.

less altered in character. They belong to the class of soft or œdematous fibromata. The structure of the tumours consists of a delicate network, formed by interwoven bands of connective tissue, from which finer fibrillar bundles branch off and interlace. In the interstices of the network thus formed are spaces of varying size and shape, containing an albuminous fluid. Numerous round cells are present in the structure, and a certain number of fusiform and stellate cells. The blood-vessels are not numerous, and are principally seen ramifying near the pedicle. A few glands are usually present in the structure. The tumour is devoid of nerves. It is covered with stratified columnar ciliated epithelium. In parts, however, the epithelium may be transformed into the squamous variety, probably as the result of mechanical causes, such as friction with surrounding parts.

The consistence of mucous polypi varies with the degree of development of the connective tissue stroma, which is usually sparse and scanty, but is most developed near the pedicle. The firmer polypi, rich in fibrous tissue, are especially found growing in the posterior part of the nasal fossæ. Dilatation of the acini of the glands, which may be present in the tumour, is not uncommon, and if very marked may give rise to cysts of various sizes. The cystic degeneration may be so extensive as to convert the whole polyp into a multilocular cyst, the walls of which present the remains of the stroma of the tumour (*cystic œdematous fibroma*). The cysts contain a mucous or serous fluid, sometimes a colloid or fatty material. In certain specimens the glandular structures are markedly increased in number, and are richly distributed throughout the whole tumour, so as to constitute a variety which may be termed *œdematous adeno-fibroma*. It is very doubtful whether, as has been maintained, simple mucous polypi ever undergo histological transformation and take on the structure and character of malignant growths.

Mucous polypi spring almost exclusively from the outer

wall of the nasal fossæ. By far the commonest apparent origin is the middle turbinated body, especially the anterior part; but, as Zuckerkandl's researches on the dead subject have shown, many of these growths have really a deeper origin in the middle meatus, the edges of the hiatus semilunaris and the infundibulum being favourite sites. They sometimes spring from the upper meatus, the upper turbinated body, and sometimes also, though very rarely, from the inferior turbinated body. They very rarely indeed grow from the septum. Sometimes a polypus is attached at several points; but this is the result of friction, with subsequent cicatricial adhesion. As they increase in size they project forwards into, or even beyond, the anterior nares. When growing from the posterior part of the fossa, they may project into the naso-pharynx, and being there free to grow, they often increase rapidly, and, acquiring a long pedicle, hang down into the pharynx. Such polypi, springing from the posterior part of the fossa, are frequently single, and, as already mentioned, are usually of a firmer consistence than ordinary polypi, owing to their containing a larger proportion of connective tissue. They also often contain cysts.

Symptoms.—The symptoms of nasal polypi are due partly to the obstruction produced by the tumours, partly to the direct mechanical pressure and irritation they produce, and finally to reflex irritation in parts outside the nasal cavity.

Until polypi have attained a certain size they may produce no symptoms. The early symptoms are similar to those of chronic rhinitis, and most patients for a long time believe a "chronic cold" to be their only trouble. They complain of stuffiness in the nose, on one or both sides, which they endeavour to relieve by frequent sniffing or blowing. A sense of fulness in the frontal region may be present. The stuffiness is increased in damp weather, which causes the polypi to swell up from absorption of moisture. Sometimes the tumour can be felt flapping to and fro with respiration, and either inspiration or expiration may be chiefly impeded

by its valve-like action. A tendency to sneezing attacks is often present, and there is increased secretion, mostly of a thin watery character. The secretion is sometimes thicker and muco-purulent, but if, as also happens, there is a chronic purulent discharge, this is probably the result of suppuration in some of the accessory sinuses. In these cases the disease of the accessory sinuses is nearly always antecedent to, and, in fact, the cause of the growth of the polypi, though it is possible that sometimes it is a result of the growths.

As the polypi increase, the nasal passage, or passages, become completely occluded, the patient breathes partly or wholly through the mouth, the senses of taste and smell are blunted, and the voice acquires the characteristic intonation of nasal obstruction. Headache is often complained of. Deafness may be present from associated catarrh of the Eustachian tubes, or from the direct pressure of the tumours when they project into the naso-pharynx. Very rarely the tear duct is pressed upon, and epiphora or lachrymal abscess results. Some chronic pharyngitis generally supervenes in long-standing cases.

It is difficult to determine how long polypi have existed in any given case. The rate of growth varies much in different cases, and in some instances, after attaining a certain size, they remain stationary for a long period, producing, possibly, little or no discomfort. This is, however, exceptional. If they continue to increase, and are not interfered with, the tumours often make their appearance in the anterior nares, and cause distension of the cartilaginous nose. They rarely produce distortion or absorption of the walls of the nasal fossæ, their soft consistence rather causing them to adapt themselves to the surrounding parts. Nevertheless, in advanced and neglected cases, deformity of the nasal chambers has occurred, and the bones of the face have been distorted, and the contents of the orbit displaced.

Of the reflex complications, bronchial asthma is the most important. Of the frequent association of asthma and nasal

polypi there can be no doubt whatever, and all who have had opportunities of seeing such cases have often observed relief of asthma follow the removal of polypi. Without any bronchial implication, a reflex cough may result from nasal polypi; but it must be remembered that cough associated with polypi may result from mucus trickling back into the larynx. Susceptibility to hay-fever, or some allied form of nervous coryza, is sometimes developed in consequence of nasal polypi. Other symptoms of the class of reflex neuroses, which have been observed from time to time to result from nasal polypi, are headache, supra-orbital neuralgia, migraine, giddiness, and epilepsy.

Polypi are generally readily seen from the front. If numerous and projecting forwards, they may be seen by simply tilting up the tip of the nose, but a speculum and good light are mostly necessary. Cocaine, which constricts the parts and opens up the view, will often aid the diagnosis, especially when a polypus is situated far back. A probe to push aside any swollen mucous membrane will sometimes help. The pale, semi-translucent appearance of the growths, and their softness and mobility; as ascertained with a probe, will readily distinguish them from all other growths, or conditions, which give rise to nasal obstruction. Fibrous, sarcomatous, and malignant growths, while wanting the above characters, bleed easily when touched. Cartilaginous and bony growths are easily distinguished by their consistence to the probe. The condition most likely to be mistaken for polypus is an erectile swelling on the anterior part of the inferior turbinated bone. These swellings are sometimes very pale, and indent very readily with a probe. Moreover, they often coexist with nasal polypi. However, the situation, and the absence of pedicle, the swelling being continuous with the inferior turbinated body, serve to distinguish these swellings from polypi. They subside rapidly on the application of cocaine solution, and sometimes diminish while we are examining, without any

application. Hypertrophic swellings and outgrowths of the mucous membrane, especially on the inferior and middle turbinated bodies, sometimes freely movable and pedunculated, may simulate polypi; but their red colour, firmer consistency, and absence of translucency, serve to distinguish them. In any case, the treatment is alike for all these growths.

When a polypus projects into the naso-pharynx, posterior rhinoscopy and digital palpation may be needed to make the diagnosis. Sometimes a large polypus may be seen from the mouth hanging down from behind the soft palate. Hypertrophic swellings at the posterior ends of the inferior turbinated bodies have to be distinguished from polypi, like the same condition in front.

Treatment.—Cases of mucous polypus vary very much in regard to their amenability to treatment, some being permanently cured with comparative ease at one or two sittings, while others are extremely inveterate, and recur rapidly and persistently, and require fairly extensive operations in order to bring about a cure.

Nevertheless, in all cases, the first stage of the treatment is the removal of the growths. Only after this has been done can a proper judgment be formed of the extent of the disease, and the further operative steps that may be required to eradicate the disease and prevent further recurrence.

Various methods are employed for the removal of nasal polypi, and each method has its advocates. While some of these are, for general use, much inferior to others, there is, perhaps, none which is not specially adapted to particular cases, and every operator should be prepared to use any method suitable to the case in hand, though he will naturally favour for general use the method in which practice has given him most skill. I am satisfied myself that some form of snaring is the most scientific and efficient mode of removal, and also that which is most agreeable to the patient.

Before operating, there are certain general points to be

attended to, whatever method be used. In the first place, a careful study of the position, size, and attachment of the growth, or growths, should be made with good illumination and the use of the probe. In the second place, a ten or twenty per cent. solution of cocaine should be applied, as far as practicable, to the lining membrane of the nasal cavity. This will diminish the pain, and will afford more room for manipulation, by reducing vascular swelling of the mucous membrane. It will also lessen the tendency to bleed.

Great difficulty is at times experienced from the narrowness of the nasal passage. A septal spur or deflection will sometimes require to be dealt with before nasal polypi can be efficiently treated. In other cases the removal of a portion, or of the whole, of the inferior turbinated body will be found necessary.

The Forceps is still widely employed, though it has of late years been condemned by many authorities on the subject (*Voltolini, Michel, Zaufal*, and others). There is no doubt, when the forceps is used in the blind and haphazard manner which was formerly in vogue, it is deserving of the epithets dangerous, brutal, painful, and inefficient, which have been applied to it. In point of fact, instances have been recorded of large portions of the turbinated bones having been unintentionally torn away, of severe hæmorrhage, and of laceration of the ethmoid, with death from meningitis. Still, the forceps is a simple, certain, and rapid method of removing polypi, and though more painful than some other methods, is quite safe, if only it be properly used.

The forceps used should be lightly made, with slender serrated blades. The nostril having been well dilated with a Fränkel's or Thudichum's speculum, and the cavity well illuminated, the polypus is to be seized as near the pedicle or base as possible, and removed by twisting the forceps. The rule should, as far as possible, be observed to seize nothing which is not seen, and in this way alone can accidents be

guarded against. Where the growths are numerous, the introduction of the forceps must be repeated two or three times, the blood being syringed or mopped away, and the cavity carefully inspected after each introduction. Several sittings may be necessary in extensive cases. Polypi, situated far back, may be difficult to seize. A finger may be passed up behind the soft palate in this case, and the forceps thereby guided to the pedicle of the growth. In order to accomplish this, it is often desirable to administer nitrous oxide gas.

Some operators use a forceps so constructed as to cut through the pedicle instead of twisting off the growth. There is no doubt, however, that twisting off effects a more complete removal of the pedicle, and diminishes the liability to recurrence.

The Wire Snare is now used by most operators, and though its skilful use requires some practice, it may be safely affirmed that it does not require more practice than does a safe and skilful use of the forceps. Two essentially different kinds of wire snare are in use, viz. the cold-wire snare and the galvano-cautery snare.

There are many forms of cold-wire snare sold. It is important to have one of slender and light make. Blake's snare (Fig. 53) is a simple and handy model. The handle is fitted with three rings, one at the extremity for the operator's thumb, and the others destined for the index and middle fingers by which the loop is tightened. The latter should have a free play on the handle of at least two inches. The tube containing the wire must be about three and a half to four inches long. Some of those sold are too short. The end of the tube should be fitted with a cross bar to prevent the loop being drawn into the tube. Thin piano wire (No. 4 or 5) is the best kind to use, on account of the resiliency of the loop.

For the removal of polypi with firm pedicles, or of portions of the middle turbinated body, Mackenzie's wire *écraseur* (Fig. 35), or Jarvis's snare (Fig. 36), will be found well adapted.

Indeed, a light and well-made wire *écraseur* of Mackenzie's pattern is an excellent instrument for all-round use in the treatment of nasal polypi, and I rarely use any other.

In examining the nares prior to operating, so as to determine the position and origin of the growth, it must be borne in mind that by far the larger majority spring from the middle turbinated body and its vicinity. Having dilated the nostril with a speculum, and thrown in a good light, the wire loop, previously adjusted according to the size of the polypus

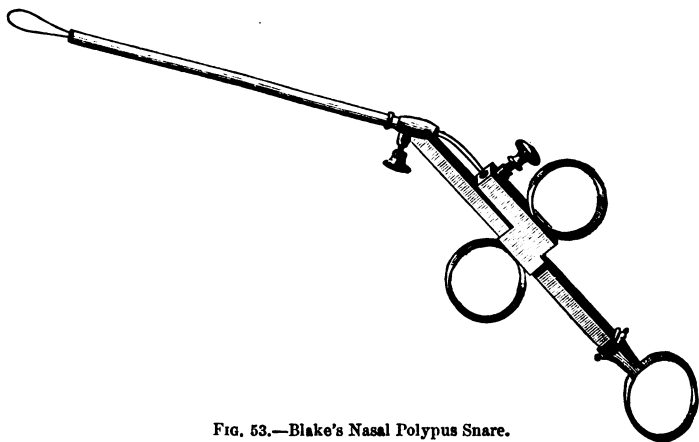


FIG. 53.—Blake's Nasal Polypus Snare.

to be seized, is introduced in a vertical position, between the septum and the polypus, and then gradually turned to a horizontal one, so as to pass under and encircle the growth. The loop is then pushed upwards and outwards around the growth, so as to engage it as near the base as possible, and the instrument is kept pressed at this point, while the loop is slowly tightened. The base of the polypus may now be divided with the wire; but it is often better, especially if we are not satisfied that we have seized the polypus close to its attachment, to tear it away with a jerk after tightening the

loop sufficiently. It is more painful, but it is more likely to prevent recurrence. One should endeavour to seize one polypus only at a time. If at any time a polypus, or a portion of mucous membrane, or bone, be seized which cannot be divided and will not yield to traction of moderate force, the wire should be released at the handle, and the loop drawn out of the tube. The above proceeding is repeated till several or all the growths are removed, the blood, which will usually be less abundant than with the forceps, being mopped or syringed away, and the cavity carefully inspected from time to time. Several sittings will be necessary to clear the nasal cavities in bad cases.

When a polypus is far back and projects into the post-nasal space, or hangs down into the pharynx, considerable ingenuity may be called for to pass the loop round it, especially if the tumour is large and blocks the posterior nares. A finger, carried up behind the soft palate, may assist, or it may be necessary to push the loop through the nose, with a suitable instrument, till it is well behind the tumour. When a polypus hangs well down into the pharynx, the snare may in certain cases be introduced through the mouth, and the loop adjusted round the growth as high up as possible. In this case the polypus will probably be divided at some distance from the pedicle, but it will afterwards be possible to remove the remainder through the nose. It is occasionally necessary to administer an anæsthetic in order to deal satisfactorily with a polypus projecting into the naso-pharynx.

The galvano-cautery snare is preferred by many operators before every other method for the removal of nasal polypi. The advantages claimed are its greater power in removing firm fibrous growths, portions of the turbinal bodies, etc., its efficacy in diminishing hæmorrhage, its destructive effect on the base of the polypus and the part immediately around, and the more perfect asepsis of the loop. The snare should be fitted with a loop of steel wire (No. 6 or 7 piano wire). This is preferable to platinum wire, on account of its resiliency.

The loop is applied in the same manner as the cold snare. As soon as the loop is tightened the current is turned on, and the base of the polypus burned through. If care be taken that the wire shall be put at a dull red heat the hæmorrhage is almost nil. If properly employed this method is as painless as any, and is freer from hæmorrhage. It cannot be denied, however, that the polypus is rarely removed so as to leave no part of the pedicle. The removal is not as complete as when, by means of the cold snare, the polypus is torn away from its attachment. The smallness of the hæmorrhage is claimed as an advantage, but the hæmorrhage rarely amounts to much with the cold snare, and the latter is a much handier instrument to manipulate. If some form of snare-écraseur is habitually used there will never be any difficulty in dividing firm growths or portions of the middle turbinal. I formerly used the galvano-cautery snare almost exclusively, but I have entirely given it up in favour of the cold snare, in the removal of ordinary polypi. It is quite certain that with either method polypi can be satisfactorily removed.

After removal of mucous polypi by either of the preceding methods, there may remain small portions of growths, or small polypi situated in the recesses of the nasal fossæ, which cannot be secured with the snare. For dealing with them, a slender cutting forceps, such as Grünwald's (Fig. 39), should be employed.

Whatever method be employed for removing polypi, however good a clearance we make at the first sitting, we may expect, in many cases, to find polypi of some size present a few days later. This, of course, is not due to a recurrence of the disease, but merely to the fact that polypi, which have been pressed out of sight by other growths, swell up and become prominent on the removal of pressure. The amount that can be accomplished at each sitting varies much according to the nature of the case, the amount of hæmorrhage, and the tolerance of the patient. It is, therefore, usually impossible to predict

exactly the number of sittings which will be necessary in any given case.

The patient should, if possible, not be lost sight of until, after the most careful search, no polypi, however small, are to be discovered. The smallest polypi must be removed with the cutting forceps or destroyed with the galvano-cautery. The employment of the cautery for this purpose is, however, more limited than is generally admitted. It should only be applied to the parts which are within view, mostly the anterior and lower edge of the middle turbinated body, and perhaps some portion of its outer surface. It is in no case desirable or expedient to blindly push a cautery point into the middle meatus, or the upper and posterior parts of the nasal fossa. Instead of the galvano-cautery, caustics have been used to destroy minute polypi or diseased and œdematous mucous membrane. Chromic acid and trichloroacetic acid are best adapted for this purpose. They are best applied in crystal form, a small surface only being treated at one time. De Havilland Hall recommends pure carbolic acid. On the whole, I think some form of cutting forceps is the best means of dealing with these conditions.

By the preceding method we can bring about a cure in many cases. In other cases persistent and rapid recurrence takes place in spite of the most careful treatment on the preceding lines, and in these cases we have to deal with deeper-seated trouble, which requires more radical measures. Suppuration of the accessory sinuses may be present, and this may require special treatment before the parts can be brought into a healthy condition and the recurrence of polypi prevented. The middle turbinal may be swollen and covered with polypoid excrescences and degenerated mucous membrane. In some cases it will be found to have largely disappeared and its place taken by œdematous mucous membrane. The points of origin of the polypi may be out of reach, in the middle meatus, the hiatus semilunaris or the ethmoidal cells.

In many cases the removal of the anterior part or even the whole of the middle turbinal is indicated, on account of its diseased condition, or in order to gain access to deeper parts. The snare-écraseur, the caustery snare, or some form of cutting forceps may be brought into use for this purpose (see p. 132). After removal of the middle turbinal, the diseased structures in the middle meatus may be removed with Grünwald's or similar cutting forceps, or with a curette or ring-knife. The ethmoidal cells may be broken down and removed to a greater or less extent if necessary.

When there is extensive bone disease, with many polypi, involving an extensive part of the ethmoid, Lack recommends a radical operation, in the first instance, under a general anæsthetic. If the middle turbinal is present it is removed with a turbinotome, and any large polypi are removed with a forceps. Then the lateral mass of the ethmoid is thoroughly scraped away with a Meyer's ring-knife, by which large masses of polypi, degenerated mucous membrane, and fragments of bone are removed. Scraping is continued until all friable tissue is removed, the finger being introduced from time to time, by means of which healthy parts of the ethmoid can be distinguished. Great caution must be observed when it is felt that the region of the cribriform plate is being reached. This or some similar operation is, undoubtedly, indicated in a certain limited number of cases, but I question whether it should be performed in the first instance, unless under very exceptional circumstances. We shall be better guided in our selection of cases for these extensive operations if we adhere to the rule, in the first instance, of removing all polypi as far as it is possible to do so, and of giving a trial to less radical measures.

After removal of nasal polypi, in ordinary cases, it is not necessary to use any local treatment, and the patient can generally pursue his avocations as usual. After more severe procedures the patient may require to remain in the house or in bed for some days, according to circumstances. Antiseptic

washes and insufflations may be indicated until the parts have healed. After the larger operations, a packing of iodoform gauze will usually be required in order to stay the hæmorrhage.

2. BLEEDING POLYPI OF THE SEPTUM.

Under the designation of bleeding polypus of the septum, a tumour has recently been described by Lange,* Schadewalt,† Heymann,‡ and others, occurring chiefly in females, and characterized clinically by a marked tendency to repeated hæmorrhage.

This tumour is always situated at the anterior part of the septum, usually low down, and either at, or a little behind the junction of the skin of the vestibule with the mucous membrane. The structure is mainly that of an extremely vascular soft fibroma, with very marked round-celled infiltration.

The tumours appear to grow very rapidly. When the case comes for treatment, the size may vary from a lentil to a bulk sufficient to completely block the passage. The tumour is roundish, or more or less flattened from pressure, of a dark red colour, and fleshy consistence. It is usually attached by a short and broad pedicle. The surface is uniformly smooth, or more or less furrowed, and often presents erosions and traces of hæmorrhage.

As already mentioned, the growth is much more frequent in females than in males, and generally occurs in youngish subjects. The patients mostly apply for treatment on account of repeated and rather profuse hæmorrhage from the nose. Some obstruction of the nasal passage may be present, according to the size of the tumour.

The treatment consists in a thorough removal of the growth. This may be accomplished by means of the cold or cautery snare, and the subsequent destruction of the stump of

* *Wien. Mediz. Presse*, 1892, No. 52.

† "*Archiv. f. Laryng. u. Rhinol.*," 1894, Bd. I. H. 4.

‡ *Ibid.*

the pedicle with a curette or the electric cautery. The operation is attended with brisk hæmorrhage, which, however, is easily controlled by a plug after complete removal of the growth. If the removal is not complete, a liability to hæmorrhage remains, and the tumour may recur.

3. PAPILOMATA.

Papillomata in the nasal passages are rare. They are met with on the fore part of the septum, the interior of the ala of the nose, and the floor of the inferior meatus, occurring singly or in groups, and generally in one nasal fossa only. They have a greyish-white colour, something similar to mucous polypi, but have a much firmer consistence. The surface is lobulated, muriform, or cauliflower-like. They are more vascular, and bleed more than mucous polypi. Their removal is therefore best performed with the galvano-cautery snare.

According to Hopmann and others, papillomata are not rare, and are most frequently seated on the inferior turbinated body. These authors include among papillomata the hypertrophies of the mucous membrane, which not unfrequently develop in a convoluted papillomatous form (p. 118) on the inferior turbinated body.

4. FIBROMATA (Fibrous Polypi).

Tumours composed principally of compact fibrous tissue are rare in the nasal passages. In the nasal cavity proper, indeed, this form of growth is very rare, the commoner situation being the naso-pharynx; and it is to this latter form of the disease that the description in this section principally applies. In the few cases in which fibromata have been met with, growing from some part of the nasal fossa, they have sprung from the posterior part of the roof, from the upper or middle turbinated body, or from the septum.

In the naso-pharynx this growth constitutes the so-called naso-pharyngeal polypus. It grows from the base of the skull, the basilar process of the occipital, or adjacent part of the body of the sphenoid. According to Grönbech, the tumour always originates from one side or other of the base of the skull, never from the middle line. It grows from the periosteum, and is firmly connected with the bone by a somewhat broad base.

The structure of these tumours is very firm, and consists of parallel bundles of fibrous tissue, and a few elastic fibres, invested by an extension of the mucous membrane. The tumours are supplied with blood-vessels, which are sometimes of large size, and are especially numerous in the pedicle and towards the surface of the growth. At first rounded or pyriform in shape, the tumour subsequently becomes irregular, sending processes in various directions of least resistance, and it tends to displace and destroy neighbouring parts as it increases. It frequently forms secondary attachments to surrounding parts.

Fibromata occur mostly in young people from fifteen to twenty, and cases have been met with in quite young children. They affect males much more frequently than females. Of forty-one cases of naso-pharyngeal polypus collected by Grönbech, thirty-six were in males, five in females. These tumours tend to come to a standstill after twenty-five years of age, and they have been known to diminish, or even disappear, after that age. In females, however, the disease is said to occur at any age, even in advanced life.

Symptoms.—Although not malignant, so far as their histological character is concerned, these tumours, in their clinical aspect, often pursue a very malignant course. The early symptoms of fibrous tumour in the nasal or naso-pharyngeal passages are, some nasal obstruction on one or both sides, together with hyper-secretion, and the occurrence of attacks of epistaxis. As the tumour increases in size complete

nasal obstruction, with its results on the voice and breathing, will arise. Pain is usually complained of, and drowsiness or sleepiness is a not unfrequently prominent symptom. Deafness usually in one ear, dysphagia, and later on dyspnoea, will be present. Meanwhile the attacks of bleeding become more frequent and more profuse, and there is often a purulent and fetid nasal discharge from more or less ulceration of the surface of the tumour.

As the tumour goes on enlarging it sends prolongations in various directions, and displaces the surrounding structures in its course. Depending on the direction in which the growth takes place, results of various kinds ensue. In its forward progress through the nasal fossa it displaces the nasal bones and the nasal processes of the superior maxillary bones, producing the facial deformity known as "frog face." Processes of the tumour may protrude through the anterior nares. Displacement of one or both eyeballs, distortion of the internal parts of the mouth, erosion of the base of the skull, and all the attendant effects of pressure in these directions, may arise in the course of the disease.

Anterior and posterior rhinoscopy, and especially digital palpation of the naso-pharynx, in the early stage, discover a tumour growing from the vault of the pharynx (in rare cases from the posterior part of the roof of the nose) with firm attachment, of a reddish or pinkish colour, irregularly round or lobulated, smooth, hard, and unyielding, and easily bleeding when touched. As the growth enlarges it displaces the velum forwards and becomes visible. Later, the deformities and displacements will render the diagnosis more easy, although, at any stage, the disease is liable to be confounded with sarcoma.

The progress of the disease is somewhat slow, but steady and progressive. From one to two years often elapses before very marked functional disturbances set in. On the whole, the younger the subject the more rapid the progress. Spontaneous

gangrene, with subsequent elimination of the tumour, has been observed. Still more important are the observations which have been recorded of the arrest and retrogression of the tumour when adult life has been reached. Death, however, is the usual termination of the disease when left to itself. It may result from progressive dyspnoea or dysphagia, from septicæmia, cerebral complications, or from repeated or abundant hæmorrhage.

Treatment.—If diagnosed in the early stage, while the growth is still small, a fibrous tumour may be removed by comparatively simple methods; but if it has reached a considerable size, it can only be dealt with by an operation, involving division of the soft palate, or resection of some of the bones of the face. These larger operations are described in surgical works, and need not be dwelt on here. For the removal of most of these tumours, however, especially for the smaller tumours, some form of wire *écraseur*, either the galvano-cautery snare or the cold steel wire *écraseur*, has been found satisfactory and effectual. If the cold wire *écraseur* is used the loop must be tightened very slowly, to avoid hæmorrhage, some hours, if necessary, being occupied in cutting through the mass. The loop may be introduced through the nose or mouth according to circumstances, and where the whole tumour cannot be engaged at once, the growth may be removed piecemeal at one or several sittings. The stump of the tumour may require repeated applications of the galvano-cautery to prevent recurrence.

Electrolysis is sometimes successful in causing arrest or recession of the growth. This method has been favourably reported on by Bruns, Michel, and also by Voltolini, who introduced some special improvements in this method. Inasmuch as these tumours tend to undergo arrest, or recession after twenty-five years of age, any treatment, operative or electrolytic, though only partially successful, may carry the patient on to the time when recession of the growth may be hoped for.

5. CARTILAGINOUS GROWTHS.

Cartilaginous outgrowths, or thickenings, are not uncommon on the anterior and lower part of the septum, being generally attached by a broad base to the septum or adjoining parts of the floor of the nose. A common situation is the line of attachment of the septal cartilage with the maxillary crest and the margin of the vomer. Such outgrowths, or thickenings, are often associated with deviation of the septum. (*See Deformities of the Septum.*)

Cartilaginous tumours (**Chondromata**) have been occasionally met with in the nose, springing usually from the cartilaginous septum, much more rarely from the outer wall or roof. They have been observed exclusively in young people. The tumour is usually of very slow growth. As it increases it gives rise to nasal obstruction, and if it attain a large size may lead to great deformity through displacement of the neighbouring parts. A chondroma forms a rounded immovable tumour in the nasal fossa. The surface is smooth, and has a firm, resisting, though somewhat elastic, feel to the probe or finger. A needle can easily be made to enter its substance, which serves to distinguish it from an osteoma. Moreover, epistaxis, which is a characteristic symptom of osteoma, is not observed in chondroma.

When small, these tumours may be removed by the knife, gouge, chisel, or by the wire *écraseur*, or galvano-cautery snare through the nasal openings. Larger tumours will require the nose to be laid open, and, possibly, parts of the lower jaw to be detached, before removal can be effected. The growth tends to recur unless completely removed.

6. OSSEOUS GROWTHS.

Exostoses, springing from the bony part of the nasal septum, are not uncommon. They usually arise by a broad base, and extend horizontally outwards towards the outer wall, on a level with the inferior or middle turbinated bone. A frequent form of outgrowth is that of a ridge running from near the nasal spine of the superior maxilla obliquely upwards and backwards, at the junction of the septal cartilage and the vomer. This ridge is sometimes partly cartilaginous, partly bony. (*See Deformities of the Septum.*) Sometimes exostoses spring from the floor of the nose.

Curious bony tumours (**Osteomata**) sometimes develop in the nasal fossæ, beneath the mucous membrane, quite unconnected with the bony framework, or occasionally connected thereto by a narrow bony pedicle. The anterior part of the floor of the nose is said to be the commonest seat of development. This form of tumour is very rare, and develops in young subjects from fifteen to twenty years old. The accessory sinuses are, more frequently than the nose, the seat of development of an osteoma, especially the frontal sinus. Osteomata are of two varieties, the hard and the soft. The former is the more common, and is composed of concentric layers of compact bone, and is of extreme hardness throughout; the latter is of spongy structure, with only a very thin shell of compact bone. The surface of the tumour is generally uneven and bossy. This tumour causes little trouble at first, perhaps a little obstruction and tendency to epistaxis. It increases slowly, but in time it tends to fill the nasal passage, and to displace or absorb the bony parietes. Severe neuralgic pains, nasal obstruction, and epistaxis are prominent symptoms. A purulent fetid discharge may be present owing to necrosis of the surface of the tumour or of surrounding parts. To the finger or probe the tumour presents a characteristic bony consistence. A needle fails to penetrate its substance. It may simulate a nasal

calculus, but the surface is generally more resistant to a needle pressed against it.

When soft they have been broken up with gouge and mallet, and removed piecemeal, but they usually require the nose to be laid open to effect removal.

Osseous cysts have been met with in the nose, generally in the middle turbinated body, but also in connection with the septum and the inferior turbinated body. In the middle turbinated body, the usual situation, the tumour appears to arise from an abnormal development of an air-space in the fore part of the body. In this way a smooth rounded tumour may be formed in the nasal passages, which fills the middle meatus, and projects against the septum, so as to block the olfactory slit. These cysts have chiefly been observed in women. The interior of the cyst is lined with a thin mucous membrane, devoid of glands, and covered with ciliated epithelium. In its simplest form this cyst contains air (pneumatic cyst), but it may also become filled with a serous or purulent fluid. Mucous polypi have also been found in these cysts, usually in association with nasal polypi. If not pronounced, a simple osseous cyst of this description has no clinical importance, but if large it may be attended with pains in the head and marked nasal obstruction. The destruction of the thin cyst wall is easily performed by means of the galvano-cautery, or a forceps or scissors.

7. CYSTIC TUMOURS.

Apart from cysts in mucous polypi, cystic tumours, resulting from morbid changes in the glandular structures of the mucous membrane, are sometimes met with in the nose, usually in the neighbourhood of the floor of the fossa. The growth of the cyst leads to gradually increasing obstruction of the passage. The cyst collapses when punctured, but usually soon refills. It must be removed as completely as possible with the snare

or forceps. In a case described by McBride, the cyst kept refilling, and had to be dissected out by raising the upper lip.

8. ANGIOMATA.

True angiomata are of very rare occurrence in the nose. They have been observed growing from the upper part of the cartilaginous and bony septum, from the upper or middle turbinated bodies, and the vault of the nasal fossa. The development of an angioma is usually somewhat slow. It gives rise to more or less obstruction according to the size it has attained. A muco-purulent discharge is generally present, but the frequent repetition of attacks of epistaxis, occurring always from one nostril, is the most characteristic symptom. The tumour has a rounded, irregular surface, and a bright red or bluish-red colour, and is usually implanted by a broad base in the upper region of the nasal fossa. Its consistence is soft to the finger or probe, it bleeds easily, and may often be seen or felt to pulsate strongly. These tumours may usually be removed through the natural passages by means of the galvano-cautery, or cold, snare. If the latter be employed, the loop should be very slowly tightened in order to avoid hæmorrhage. The base of the tumour may have to be treated with the galvano-cautery.

9. MALIGNANT GROWTHS.

Malignant disease is rare in the nasal passages. The round or spindle-called sarcoma is the form which mostly occurs. The rare cases of cancer, which have been reported, have been generally of the epitheliomatous variety. Epithelioma will be squamous or cylindrical, according as it develops from the lining of the vestibule or from the mucous membrane of the fossa. The nasal fossa may be invaded by malignant growths originating in the antrum or other accessory sinus.

Malignant growths affect children and persons past middle life, sarcoma occurring chiefly at the earlier period. They may spring from any part of the nasal cavity, but are said to arise most often from the anterior half of the septum. The interior of the ala is sometimes the seat of sarcoma, or epithelioma. A sarcomatous tumour in the naso-pharynx sometimes becomes pedunculated, constituting malignant polypus.

The symptoms will be at first merely obstruction of the nasal passages and its attendant discomforts, with increased nasal or post-nasal discharge, purulent and fetid. Frequent and severe epistaxis is often a prominent symptom. Pain will generally be present as the disease advances. Deformity of the face from spreading out of the nasal bones, or protrusion of the eyeball, and erosion of the base of the skull, may result. If the growth is cancerous, the glands at the angle of the jaw, and at the side of the neck, will early become affected.

Malignant tumours will generally be recognized by their rapid growth, the abundant discharge, and hæmorrhage, as well as by the physical characters and appearance of the growth. They are softer than fibromata, and less distinctly pedunculated.

If the disease be recognized early, extirpation by resection may be attempted, for although recurrence is to be feared, still life may be thereby prolonged. The growth of malignant tumours seems to be sometimes delayed by frequent and energetic application of the galvano-cautery. If the disease is far advanced all operative interference is useless.

XXII. SYPHILIS OF THE NOSE.

1. ACQUIRED SYPHILIS.

INSTANCES have occasionally been reported of a **primary syphilitic sore** occurring in the nose. The sore may be situated on the skin about the tip or ala of the nose, or in the vestibule, or it may be situated within the nasal fossa, on the septum. A primary sore has also been met with in the region of the posterior nares, through contamination conveyed by the Eustachian catheter. During the **secondary period** the nasal mucous membrane is said to be not unfrequently affected. The disease assumes the form of erythematous patches, or of slight erosions or mucous plaques, on the fore part of the septum or inferior turbinal, but, owing to the situation and the slightness of the symptoms, these manifestations are mostly overlooked. Indeed, from a purely clinical point of view, secondary syphilis of the nasal mucous membrane may be said hardly to exist, in contrast to the frequency of the manifestations of secondary syphilis in the fauces and pharynx. The orifices of the nostrils are more often affected. Here small erosions, cracks, and fissures may be present which are apt to get covered with yellowish crusts, and may give rise to much discomfort.

Tertiary lesions of the nose are more common and more important than those of the secondary period. A deposit of gummatous infiltration may take place in the mucous membrane, which after a time breaks down, leaving an ulcerated surface. The gummatous infiltration usually involves the whole thickness of the mucous membrane, the deepest layer of which constitutes

the periosteum and perichondrium, and the breaking down of the deposit lays bare the bone and cartilage, and leads to necrosis of these structures. In some cases the primary deposit is in the bone itself. The most frequent seat of gummatous infiltration is the septum, either in its cartilaginous or osseous part; but the floor, roof, or structures on the outer wall, or the parts constituting the external nose may be affected.

In the nose as elsewhere, the gummatous infiltration may develop rapidly, or slowly and insidiously. After a longer or shorter period, softening and breaking down with more or less loss of substance ensue. When seated in the nasal fossa, the symptoms in the earlier stage are those of more or less complete obstruction, with increased secretion. Pains in the head or face are often present, and they may exhibit the usual nocturnal exacerbations. These symptoms may continue for some weeks or months, gradually increasing. During this period the disease is unfortunately only too often unrecognized. Sooner or later symptoms of a different character and more serious nature arise. The discharge increases in quantity, becomes purulent, offensive, and not unfrequently blood-stained. Crusts form in the nasal passages, and are discharged from time to time. There is now generally an intolerably offensive odour, and the term syphilitic ozæna is applied to the condition. It may here be mentioned, with regard to the offensive odour, that no amount of cleansing will ever thoroughly remove it, in contrast with the behaviour of the odour of simple ozæna (atrophic rhinitis). After a time particles of dead bone may be discharged with the secretion, or may drop back into the throat and be spat up. Meanwhile the external nose may have gradually sunk in, to a greater or less extent, constituting a permanent and characteristic deformity.

On examination of the nose a definite thickening of the nasal bone may be apparent from the outside, or there may be some general tumefaction about the root of the nose. On

rhinoscopic examination swelling may be observed in some parts of the passage, often on the septum, and the swelling may be such as to completely prevent inspection of the cavity. At a later stage ulcers of a deep, irregular, ragged character will be present, at the bottom of which bare bone may be seen, or more often detected with the probe. It will generally be necessary to cleanse the cavities with a syringe, to remove the dirty brown or greenish crusts which conceal the parts. Perforation of the septum is very commonly found, involving usually the cartilaginous part, but often enough the bony structure as well. The perforation has generally a rounded form, the edges being covered with adherent crusts. Sometimes there is more than one perforation. The posterior edge of the vomer between the choanæ generally remains intact, and so does the columna in front.

The floor of the nose is often involved in the gummatous infiltration, and necrosis of the whole thickness of the hard palate may ensue. In this case a rounded fluctuating swelling forms in the roof of the mouth, near the middle line, which soon breaks down, and allows dead bone to be felt with the probe. Finally, through loss of a portion of the bone, a hole may be left between the mouth and nose. The turbinated bones may be partially or wholly destroyed, in the latter case leaving a very wide, roomy nasal passage. In rare cases the destruction of bone may involve the base of the skull, and may thus lead to meningitis.

One of the most characteristic results of nasal syphilis is deformity of the external nose. This varies in kind and degree, and is sometimes absent even in severe cases. In consequence of the loss of the support which should be afforded by the septum, combined with relaxation of the tissues uniting the cartilages to the nasal bones above and behind, the lower part of the nose sinks in, and is, moreover, more or less retracted within the upper bony segment. The profile of the nose then presents a broken line, the break being caused by the projection

of the lower ends of the nasal bones, and a slight groove in the integument at this level indicates the recession of the lower into the upper segment. In point of fact, if the tip of the nose be drawn forwards, the groove is obliterated, and the deformity corrected for the moment. If the nasal bones themselves have been attacked by the disease, the bridge of the nose may fall in, below the frontal spine. With the falling in of the bridge the soft parts seem to drag on the tip of the nose, tilting it up, and causing the anterior nares to look more directly forwards. In other cases, again, the whole of the prominence, from the frontal spine to the tip of the nose, sinks in, and is replaced by a flat, or even a concave surface. In rare cases the tissues of the external nose may be eaten away by the disease.

The **naso-pharynx** is sometimes the seat of tertiary syphilis. Gummatous infiltration of the soft palate often breaks down, on its posterior aspect, first, and the resulting ulcer can only be seen with the aid of the rhinoscopic mirror. The posterior wall of the naso-pharynx is sometimes the seat of a deep, round, tertiary ulcer, which may be detected by raising the soft palate, or with the aid of the rhinoscope. Simultaneous ulceration of the posterior surface of the palate and the wall of the naso-pharynx may eventuate in cicatricial adhesion, and partial or complete occlusion of the lower opening of the cavity.

Treatment.—The constitutional treatment must be conducted on the ordinary lines, according to the stage of the disease and the condition of the patient. Locally, an alkaline lotion may be found useful in the coryza of secondary syphilis. Erosions, fissures, or mucous patches may be touched with nitrate of silver or with a solution of chromic acid (gr. x. to ʒj).

In tertiary syphilis, after the establishment of ulceration, frequent washing out of the nasal cavity with disinfecting lotions, by means of a douche or syringe, will be necessary to remove the secretions and counteract the offensive odour. After thorough cleansing, which ought to be repeated at

least once daily, iodoform or iodol may with advantage be insufflated into the cavity. In some cases it is very useful to scrape, with the sharp spoon, the deep unhealthy ulcers which lead down to diseased bone. Loose sequestra should be carefully removed with forceps as soon as practicable.

2. INHERITED SYPHILIS.

The early, or secondary, stage of inherited syphilis shows a special predilection for the pituitary membrane. The symptoms are often present at birth, and if not, they generally develop within the first month or six weeks. The mucous membrane is congested and swollen, and probably mucous patches are often present, though it is usually difficult to detect the exact condition. There is more or less discharge, and the nose is partly or wholly blocked, whence results the noisy nasal breathing known as "snuffles." The discharge is thin at first, and afterwards becomes thick and yellow. The orifices of the nose often get cracked, and mucous patches, radiating fissures, or small ulcers occur about the angles of the *alæ nasi*. The passages may become blocked with crusts, and a more or less sanious fluid may ooze from the nose. The interference with breathing, caused by the nasal obstruction, may be a serious hindrance to suckling, and lead to suffocative attacks in sleep. The inflammatory condition of the mucous membrane in infants very rarely extends to the periosteum and perichondrium so as to lead to destruction of these structures and of the subjacent bone and cartilage. Nevertheless, a certain amount of nasal deformity is quite common in syphilitic infants. This consists in a flattening and spreading out of the bridge of the nose. This condition may be present very early, and may attain a very marked degree without any evidence of disease of nasal bones or septum. The exact nature of the process which leads to this common deformity is uncertain.

The later stage of inherited syphilis, corresponding to the tertiary stage of acquired syphilis, is often observed in the nose. The symptoms may commence at any age between three and four years and adult life. Occasionally they are continuous from infancy with the early symptoms just described, but usually a period of freedom of some years intervenes. Probably the most frequent date of the outbreak of late symptoms is at, or shortly before, puberty. Sometimes the disease begins as tubercular nodules on the fore part of the septum, or the interior of the *alæ* of the nose, where the lesions are more or less accessible to view. The tubercles break down, leaving little ulcers which may run together. The surface of the ulcers is often covered with crusts, which more or less obstruct the nasal orifices. The disease in this condition, as Fournier points out, is too often mistaken for a scrofulous eczema, or impetigo, and treated accordingly. Portions of the *alæ nasi*, or cartilaginous septum, may be eaten away before the disease is arrested. More often the gummatous deposit takes place in the deeper parts of the nose, and the symptoms resemble those of a chronic rhinitis. The nose is obstructed, and there is more or less mucopurulent secretion and formation of crusts. After some months the secretion becomes purulent, blood-stained, and offensive. Even then the disease is often enough attributed to scrofula. Finally, pieces of bone may be discharged, and deformities of the external nose may occur, exactly like those already alluded to under the head of acquired syphilis, and from exactly the same causes. Perforation of the nasal septum at some part is one of the most constant lesions of inherited, as of acquired syphilis. Perforations of the hard palate may also occur from disease commencing in the floor of the nose.

Meldenbauer lays stress on the fact that after extensive syphilitic disease (inherited or acquired) of the nasal cavity, even when the complaint has been thoroughly cured, the

mucous membrane does not return to its normal condition, but passes into an atrophic state, which bears a striking resemblance to atrophic rhinitis. The wide cavity resulting from more or less destruction of the turbinated bodies may contribute still further to the resemblance. The presence of perforation of the septum, or of obvious scars, or cicatricial bands, would lead to a correct diagnosis; but, no doubt, these two conditions are sometimes confounded.

The posterior wall of the naso-pharynx may be the seat of a round deep ulcer, concealed from view by the soft palate, and often difficult to discover with the rhinoscopic mirror, on account of the age of the patient. Ulceration in the region of the soft palate and pharynx may lead to cicatricial adhesions, and partial or complete closure of the naso-pharynx from below.

The diagnosis of late inherited syphilis from lupus is sometimes a matter of difficulty, and syphilitic affections of the nose are not unfrequently regarded as lupus, with results of a disastrous character for the treatment of the disease. Lupus pursues, on the whole, a slower course than syphilis. It is usually accompanied by similar lesions on the face. It rarely, if ever, leads to destruction of the bony framework of the nose, whereas syphilis does so habitually. The peculiar deformities of the external nose, described above as resulting from loss of support within, especially the collapse of the bridge, are almost invariably diagnostic of syphilis, as also are the perforations of the hard palate. In doubtful cases the administration of iodide of potassium will clear up the diagnosis.

Treatment.—In infants the administration of mercury, internally, or by inunction, will be necessary. In bad cases it will be requisite to clear the nasal passage of the accumulated discharges. In most cases this may be accomplished with a little mop of wool on a holder or a camel's-hair pencil. In other cases careful syringing with a tepid alkaline lotion

will be needed. Spoon-feeding, or even the stomach-tube, may be necessary where the nasal obstruction interferes seriously with the infant's power of sucking.

In the later forms of inherited nasal syphilis the local and general treatment is identical with that of the corresponding state in the acquired disease.

XXIII. LUPUS AND TUBERCULOSIS OF THE NOSE.

LUPUS.—Primary lupus of the nasal mucous membrane is not uncommon. Owing to the insidious course, and the slight symptoms which sometimes characterize its course, it is apt to be overlooked until the presence of the disease on the exterior of the nose or some other part of the face calls attention to it. Lupus of the nose is met with in children and young persons. According to Moure it appears to be most common between twenty and thirty years of age, but my own experience would lead me to place the period of greatest frequency in the previous decade.

It affects chiefly the anterior part of the nasal passage. The region of the cartilaginous septum is the part most often affected, and the disease may spread thence to the floor of the nose and the fore part of the middle and inferior turbinated bodies. It may also extend to the posterior regions of the fossæ, or it may invade the naso-pharynx. Both nasal passages are generally affected. The symptoms are very slight at first, being merely those of chronic coryza. Gradually the obstruction increases, and crusts are picked or blown from the nose. Some purulent, perhaps fetid discharge may be present, but more often there is none.

On inspection, after removal of any crusts that may be present, the characteristic small pale red lupus nodules may be discovered, and more or less ulceration may be found. Sometimes fungating wart-like vegetations cover the diseased surface. Perforation of the cartilaginous septum is often present, but it may need the probe to detect it, as the perforation

is often concealed by fungous granulations. Necrosis of the bones is said never to result from lupus (*Kaposi*). The cartilage of the alæ may be involved, and one or both alæ destroyed. The progress of the disease is slow, extending over years. In the absence of lupus nodules on the skin, the diagnosis of nasal lupus may be difficult. A careful examination of the parts, after removal of the crusts, may enable the little lupus granules to be recognized, and the characteristic scarring here and there, while ulceration is spreading in other places, may be seen. The chief difficulty is in distinguishing lupus from syphilis. Lupus, however, pursues a slower course than syphilis. It does not implicate the bones. Lupus nodules frequently coexist on the external parts. The history may throw light on the nature of the disease, but it must be remembered that lupus may occur in a syphilitic subject. In some cases a course of iodide of potassium is the only sure test of the nature of the complaint.

Treatment.—General treatment with cod-liver oil, arsenic, iron, etc., should be carried out. The local treatment is very important, and should aim at destroying the affected tissue. This is best done by thoroughly scraping with the curette. My own experience is that lupus of the nose yields more satisfactory results with scraping than lupus in any other region. The galvano-cautery point is employed by some, and caustics, such as chloride of zinc, chromic and lactic acid, are also recommended. These may be useful to supplement scraping with the curette, but the latter procedure should never be omitted or delayed.

TUBERCULOSIS.—Tuberculous disease of the nasal mucous membrane is very rare, though, no doubt, it is sometimes overlooked. Several cases have been described in late years by various observers. It has been met with as a primary disease, but is almost invariably associated with tuberculosis of the lungs. It may occur at any age, but most of the recorded cases have been between ten and forty years of age. The

favourite situation is the septum, and it appears usually to commence there, though, in long-standing cases, the floor of the nose and the turbinated bones may be involved.

The disease has been met with in two principal forms, viz. as tuberculous ulceration, and as tuberculous tumours. These two forms may be present together. Ulceration begins usually insidiously. There may be one or more ulcers, usually only one, and the favourite situation is the septum, or floor, not far from the anterior naris. The ulceration may extend from the nose on to the upper lip. Tuberculous ulcers in the nose resemble ulcers of the same nature elsewhere. They have a rounded or oval shape, a dirty, greyish-yellow, uneven base, and raised, irregular edges. Little caseous nodules, or miliary granulations, may be present here or there on the base, and, around the ulcer, yellowish-grey granulations may be seen. The ulcers are very chronic, showing no tendency to heal. Perforation of the underlying cartilaginous or bony septum may occur.

Tuberculous tumours have been met with of various sizes, from a millet-seed to a walnut, and have been found seated on the cartilaginous septum and on the inferior turbinated body. The colour varies from pale to dark red, and the surface is often uneven and raspberry-like, and easily bleeds. The consistence is soft and friable, somewhat harder at the base. After a time these tumours may break down into ulcers.

The symptoms of tuberculous disease in the nose consist of some nasal discharge, attended with more or less obstruction. The discharge may be serous at first, but afterwards becomes purulent and fetid. There is generally no pain. The existence of chronic ulceration or nodular swellings, with phthisical history or symptoms, will raise the suspicion of tubercle. Microscopical examination of the growths and ulcerated tissue, revealing a structure characteristic of tubercle, giant cells, and tubercle bacilli, is the surest means of diagnosis.

The bacilli, however, are described as being few and by no means easy to find. The diagnosis from lupus may be very difficult, as might be expected from our knowledge of the nature and etiology of the two diseases. Microscopical examination cannot be relied upon, and the clinical aspect of the case must be the means by which the diseases are to be differentiated. The presence of lupus nodules on the skin cannot be considered absolutely decisive, as in some recorded cases, where lupus of the face was present, the disease assumed the character of tuberculosis in the nose.

Treatment.—Mild disinfecting lotions, and iodoform or iodol insufflations, should be used to correct the fetor and discharge. Attempts should be made to eradicate the disease by scraping away the diseased tissue with a curette, or destroying it with the galvano-cautery. The application of lactic acid sometimes proves efficacious. Complete healing of the ulcers is said to be rarely accomplished, and relapses often occur after apparent cure. Tuberculous tumours may be removed with the galvano-caustic or cold snare, and the base curetted. Permanent cure appears to be more common in this than in the ulcerative form.

XXIV. AFFECTIONS OF THE NERVES.

1. OLAFACTORY NERVE.

Anosmia.—Anosmia, or loss of smell, is the commonest derangement of the olfactory sense. The causes of anosmia are various, inasmuch as several conditions are concerned in the proper performance of the function of the olfactory nerve. These conditions are, firstly, the integrity of the olfactory nerves and centres; secondly, a normal condition of the mucous membrane in which the nerve is distributed; thirdly, free access of air, containing the odorous emanations, to the olfactory region.

The olfactory nerves, or bulbs, may be injured by blows or falls on the head, and the bulbs may suffer from the presence of intra-cranial tumours, inflammation, or abscess. Congenital absence of the olfactory bulbs and nerves has been recorded by Rosenmüller and Pressat. In disease of the cerebral hemispheres loss of smell is rare, and in the cases reported the anosmia was generally, though not invariably, on the same side as the lesion. Loss of smell on one side, *hemianosmia*, is an occasional hysterical manifestation. Anosmia is sometimes noticed as a symptom in locomotor ataxy. Excessive stimulation of the olfactory nerves by strong smells has been known to cause temporary or permanent anosmia. Anosmia has been observed in lead-poisoning, as a sequel of acute infectious diseases, and in syphilis, without any sign of cerebral or other lesion. Presumably in some of these cases, as in the anosmia sometimes observed after influenza,

we have to deal with a neuritis. In old age the acuteness of the sense of smell diminishes.

Pathological conditions of the mucous membrane containing the terminal distribution of the olfactory nerves may produce anosmia. Among such may be instanced atrophic rhinitis, and inflammatory conditions associated with suppuration of the accessory sinuses, more particularly the posterior ethmoidal cells, also trophic changes the result of long-continued paralysis of the fifth nerve, and abnormal dryness from any cause. A douche containing medicinal substances, such as zinc, alum, and carbolic acid, sometimes exerts an injurious influence on the olfactory region, probably by injury to the epithelium, which leads to anosmia. It would appear that the presence of pigment in the olfactory membrane is important for the integrity of the sense of smell. Loss of pigment in this region, in consequence of general loss of pigment all over the body, has been found associated with disappearance of the sense.

Of obstruction to the free passage of air the commoner causes are hyperæmic or inflammatory swelling, hypertrophic conditions, polypi, accumulation of crusts and secretions, deviation of the nasal septum, paralysis of the dilator muscles of the nostrils, and occlusion of the naso-pharyngeal passage by syphilitic cicatricial contraction or otherwise. Moreover, destruction of the external nose, by which the current of air is no longer directed upwards in inspiration, impairs the power of smell. Sometimes no cause can be discovered in spite of the most careful examination or inquiry.

Symptoms.—Loss of smell may be partial or complete, and may affect one or both nostrils. When it affects only one side, the patient may be unaware of the defect, which will only be detected by testing each side separately, the other nostril being closed. In testing the sense of smell, one must be careful to use substances which are merely odoriferous, such as musk, camphor, assafoetida, peppermint,

or oil of cloves, and not those which, like ammonia or acetic acid, irritate the fifth nerve. It is also important to use substances which are familiar and can be easily named. Some estimate of the degree of anosmia may be obtained by testing the patient with a graduated series of odours, such as those of turpentine, camphor, musk, and vanilla, the last of which will be perceived by one whose sense of smell is all but completely lost. Zwaardemaker's olfactometer, for estimating diminution in the acuteness of the sense of smell, is described at page 46. Persons affected with anosmia very commonly say they have lost their sense of taste. On testing them, however, with salt, acid, sweet and bitter substances, it will be found that taste proper is not affected, but merely the perception of flavours. This perception is accomplished by the olfactory nerve, which is stimulated in this case by odorous particles reaching it by the posterior nares. On the other hand, there is often complete inability to appreciate odours through the anterior nares, owing to obstruction, and yet some perception of flavours remains, owing to the free access of odoriferous particles to the olfactory region through the posterior nares.

Treatment.—All local obstructive diseases, such as hypertrophic rhinitis, polypi, etc., will be treated on the ordinary lines. It must be remembered that when from any cause the function has been long in abeyance, the removal of the cause may not be effectual in restoring the sense.

Strychnia taken internally, or applied locally, as a snuff, to the mucous membrane of the nose, has been found to increase the keenness of the sense of smell. This drug, therefore, is indicated in many cases of neurotic or doubtful origin, and in cases where the sense is impaired through having been long in abeyance. Althaus recommends a snuff containing a twenty-fourth of a grain of strychnia in two grains of powdered sugar to be used three times a day, the dose being increased up to a sixteenth or a twelfth of a grain.

The constant current has been recommended for anosmia,

the positive pole being placed behind the mastoid, the negative to the nasal bones. Too strong a current will cause faintness and giddiness, and must be avoided, although, as Althaus has pointed out, a very strong current is necessary in order to stimulate the olfactory nerve.

Iodide of potassium is, of course, indicated if syphilitic disease in the nerve centres, or elsewhere, be the suspected cause.

Hyperosmia and **Parosmia** are terms applied, respectively, to an exaggeration and a perversion of the sense of smell. Excessive sensitiveness of the olfactory organ is most frequently noticed, as a symptom, in hysterical subjects. It is also occasionally met with as an idiosyncrasy in certain persons who are peculiarly affected by particular odours. Parosmia is met with in two forms, either as a perception of odours which are not present, or, more frequently, as an alteration of the odour which is presented, the alteration being usually of an unpleasant character. Subjective sensations of smell may result from irritation of the nerve or of the cerebral centres. Epileptics, as is well known, are sometimes subject to a sensory aura in the form of an olfactory sensation. Insane persons are frequently subject to hallucinations and illusions of smell. Cerebral disease, and affections of the olfactory bulbs and nerves, may be attended with perversions of the sense of smell. Anomalies of smell are sometimes met with in persons apparently healthy in every way. Morell Mackenzie mentions the case of a man to whom violets always seemed to smell like phosphorus, and another to whom mignonette had the odour of garlic. Some cases in which subjective sensations of unpleasant odours are complained of, which were formerly regarded as instances of parosmia (*cacosmia*), are now known to be due to the presence of a latent suppuration of one of the accessory sinuses.

2. THE FIFTH NERVE.

Anæsthesia of the nasal mucous membrane is rare. Diminution of sensibility is sometimes present in well-marked cases of atrophic rhinitis, though not to the same extent as anosmia. Anæsthesia may result from lesions of the fifth nerve, or of its nucleus of origin, or from some central lesion of the hemisphere. Hemianæsthesia is sometimes observed in hysteria, and in some cases of hysteria anæsthesia has been present on both sides. The whole of the nasal mucous membrane is rarely affected in these hysterical cases.

The characteristic sign of paralysis of the fifth nerve is insensibility to touch, which can be easily demonstrated with a probe. Pungent odours are not perceived, and there is absence of sneezing on the application of irritants. Complete anosmia may be present on the affected side, owing to trophic changes in the mucous membrane. Other symptoms have sometimes been noted, such as dryness of the affected passage, ulcerative (trophic) conditions, excessive secretion (rhinorrhæa), and sanious ichorous discharge, or frequent epistaxis.

Hyperæsthesia of the nasal mucous membrane is common. The condition is of interest, not only on account of the local symptoms resulting therefrom, but also on account of the symptoms in more distant parts, which are so often found associated with it. The sensitiveness of the nasal mucous membrane varies in different persons within what may be considered physiological limits. The tendency to hyperæsthesia may be inherited, and it may be associated with neurotic conditions of various kinds. It is undoubtedly often acquired by long-continued peripheral irritation from intra-nasal disease.

Hyperæsthesia manifests itself by excessive sensibility, unpleasant sensations, itching or tickling feelings, sneezing, and increased secretion, on the application of the slightest irritant. Hypersensitiveness to certain special irritants, such

as the pollen of plants, may exist in certain individuals. Moreover, irritation in other parts, such as the eye, the ear, or the sexual organs, may excite the hyperæsthetic mucous membrane. The various affections which arise in distant parts as the result of excitation of a hyperæsthetic nasal mucous membrane, are referred to in the section on Reflex Nasal Neuroses.

Treatment.—The treatment of these affections must be directed to the cause, where this is discoverable. So far as hyperæsthesia may depend on intra-nasal disease, the treatment will be directed towards the removal of the disease. Cocaine applied to the nasal mucous membrane produces temporary anæsthesia, and relieves all the symptoms of hyperæsthesia. The effects, however, soon pass off. Menthol also produces a temporary anæsthesia of the mucous membrane (see p. 84).

The destruction of hyperæsthetic areas with a chemical caustic, such as chromic acid, or with the galvano-cautery, has been recommended. The most sensitive areas should be sought out with a probe, and only a limited area treated at any one sitting. This treatment is sometimes successful, but often enough it fails.

3. FACIAL NERVE.

Paralysis of this nerve is attended with flaccidity of the corresponding ala nasi. The nasal aperture is narrowed, and, so far from dilating, it tends to be drawn inward by the act of inspiration or sniffing. The sense of smell and nasal respiration are interfered with, and when both nostrils are affected oral breathing is a necessity.

There is another and commoner form of paralysis of the muscles which move the alæ nasi, which is due, not to affection of the nerve, but to wasting of the muscles from long disuse. Collapse of the nares from this cause is observed in cases of

long-standing nasal obstruction, and may thus remain an independent cause of obstruction, after the original disease, as for instance adenoid vegetations in childhood, has ceased to act. In these cases some form of apparatus to keep the nares patent, such as a little rubber or celluloid ring inserted in the vestibule, and worn continuously, has been employed. I have tried this plan in some cases, and although temporary relief has resulted, I cannot say that I have observed permanent benefit.

XXV. DISEASES OF THE ACCESSORY SINUSES.

1. ANTRUM OF HIGHMORE.

Acute inflammation of the lining membrane of the antrum is not uncommon. The causes are those which will be presently enumerated in connection with empyema of the antrum.

The symptoms are often slight, and either pass unnoticed, or are attributed to some complaint (acute rhinitis, influenza, etc.) of which the antrum trouble is a complication. In certain cases the symptoms are pronounced and sufficiently characteristic. The fever is generally slight, but it may be severe, and ushered in with chilliness or a rigor. A feeling of tension is present in the upper jaw, and this may increase to severe deep-seated pain, which often radiates to the teeth and the temporal region, and is increased by coughing, sneezing, stooping the head forward, and by mastication. Severe supra-orbital neuralgia is not uncommon, and may suggest the frontal sinus as the seat of the disease. One or more of the bicuspid or molar teeth may be tender when percussed. Occasionally some swelling of the cheek on the affected side is present, with or without slight redness of the skin. A discharge from the nose, mucoid, muco-purulent, or purulent, may be present from the commencement; but more usually the secretion collects in the antrum for a few days, during which the subjective symptoms gradually increase, and then a sudden flow of secretion takes place, which is discharged from the anterior naris, or passes back into the throat. With this sudden flow the symptoms may abate rapidly. Not

unfrequently a second or third period of retention, with exacerbation of symptoms, occurs. As regards the character of the secretion, it is often purulent or muco-purulent, not unfrequently blood-stained, and it may or may not be fetid. On the other hand, it may consist of a thin serous fluid, or of glairy tenacious mucus. It may be clear and colourless, or of an amber or brownish tint. Most cases of acute inflammation of the antrum get well in from one to three weeks. A certain number pass into a chronic condition. Some persons remain subject to recurrence of acute antrum trouble at long intervals, it may be for years.

The diagnosis is readily made when the symptoms are pronounced and characteristic. On the other hand, rhinoscopic examination and some of the methods employed in the diagnosis of chronic empyema may be necessary, in order to establish the nature of the case. The treatment will be referred to in connection with that of empyema of the antrum.

Chronic inflammation of the maxillary sinus, with more or less accumulation of secretion, sometimes mucous, more often purulent, is very common. When the secretion remains non-purulent, the symptoms, while bearing a general resemblance to those of empyema of the antrum, to be presently described, are less marked, and the discharge is transparent, sero-mucous, sometimes glairy, and non-fetid. The contents may accumulate owing to swelling about the edges of the ostium maxillare, and give rise to considerable pain which often assumes the form of a supra-orbital neuralgia. The symptoms suddenly subside on the appearance of a profuse discharge of clear fluid from one nostril. Complete closure of the orifice may lead to distension of the sinus, and thinning of bony walls. Most, if not all cases, however, of distension of the maxillary sinus with clear fluid are due to the growth of a cyst in the cavity.

Suppuration or empyema of the antrum is the commonest and most important complaint affecting this cavity, and it will therefore be desirable to treat this subject in some detail.

Empyema of the Antrum.—Although suppuration of the antrum may present itself in the form of an acute or chronic disease, it is in its chronic form that we have mostly to deal with it. Many cases of chronic empyema date from an acute attack. In the majority of cases of chronic empyema, however, no history is obtained of an acute onset. Probably in many cases the symptoms of the acute attack were unrecognized, or have been forgotten at the time the patient comes under notice.

Causation.—Clinical facts prove conclusively that a large number of cases of empyema of the antrum are caused by disease (caries, periostitis, alveolar abscess, etc.) in connection with the roots of the teeth. This is not to be wondered at, seeing that the roots of some of the teeth, viz. the canines, bicuspid, and first and second molars, are separated from the antrum, ordinarily, by only a thin plate of bone. The roots of the first molars are those which approach most closely to the cavity, and sometimes these roots, and those of the second molars, pierce the bony wall, and are only covered by periosteum. Occasionally the onset of an empyema dates from the extraction of a tooth.

An acute rhinitis is the starting-point of many cases of empyema of the maxillary, as well as of other sinuses. It is doubtful whether the sinus inflammation should be regarded as being secondary to the inflammation of the nasal mucous membrane. It seems, indeed, more probable that there is a simultaneous inflammation of the nose and sinus. Influenza is a common cause of empyema. It is well established also that various other infectious diseases (pneumonia, typhoid, facial erysipelas, scarlet fever, measles, etc.) may cause suppuration of the antrum.

Certain forms of chronic rhinitis, and especially ozæna, may give rise to the disease. Narrowing or occlusion of the orifice of the sinus by swelling of the mucous membrane, hypertrophies, or polypi, was formerly regarded as a cause of

empyema, but it is doubtful whether such conditions can do more than predispose to the occurrence of suppuration. When they coincide with chronic suppuration of the accessory sinuses, they are nearly always secondary to the disease of the sinus.

Occasional causes of antrum suppuration are injuries of the superior maxillary bone, intranasal operations, syphilitic disease of the nose or upper jaw, and malignant growths.

It must also be mentioned that the antrum is sometimes infected by disease in the neighbouring sinuses, viz. the frontal sinus and anterior ethmoidal cells. Pus trickling down the hiatus semilunaris may enter the ostium maxillare and set up disease in the antrum.

Antrum suppuration is commonly met with in adults, but occurs also in childhood, chiefly from ten years onwards.

Symptoms and Diagnosis.—A purulent nasal discharge is the most constant symptom, and that which usually attracts the attention of the patient. This discharge is unilateral, except in cases where both antra are affected. If the amount of pus escaping be large, some may occasionally enter the opposite side through the posterior naris, and thus escape from that nostril also. The pus is usually of a bright yellow colour, and almost always fetid, and both the smell and taste are perceived by the patient. The fetor is apt to be experienced in a suddenly occurring, intermittent manner, at certain moments, as the discharge enters the nose from the sinus. Although the odour is experienced by the patient, nevertheless these patients are not as a rule disagreeable to their neighbours like those suffering from syphilitic or simple ozæna. This subjective sensation of fetor without any odour being noticed by those around, is very characteristic of suppuration of the accessory sinuses, especially of the antrum and ethmoidal cells, and many cases of a latent character go on for years without any other symptom being complained of. Such cases are often misunderstood, and set down as instances of hallucination.

The discharge is always more or less intermittent, and is usually most marked in the morning. It is often observed to appear suddenly as the patient holds his head forwards, as in writing, and it may under these circumstances trickle down and drip from the nostril. During the night the pus is apt to flow, mainly, or solely, backwards, and the patient complains of a disagreeable taste on waking in the morning. In some cases the discharge takes place exclusively backwards, even in the daytime. The chief symptoms which indicate the affection in such cases are the disagreeable taste, the hawking, and other discomforts arising from the presence of secretion in the pharynx.

Some stoppage of the nose is a common symptom of empyema of the antrum. It may be due to accompanying hypertrophy or polypi, or to accumulation of inspissated secretion or crusts in the nasal passages. Irritation of the skin, eczema or cracks, may be present at the anterior naris owing to the constant discharge from the nose.

Pain is not a common symptom in chronic empyema. It is chiefly observed in acute cases or during an exacerbation of a chronic empyema. It may be located in the region of the infra-orbital nerve, or in the teeth, or in the back of the head, but probably the most frequent seat is the frontal region or along the course of the supra-orbital nerve. The reason of this is not obvious, but it is necessary to bear the fact in mind, as otherwise the presence of pain in this region might lead to the diagnosis that the disease existed in the frontal sinus or ethmoidal cells. The pain may assume the character of a typical periodic neuralgia. In some cases it will be observed that the pain gradually increases for several days, or even weeks, while the nasal discharge has diminished or ceased, and suddenly ceases with a reappearance of a free discharge.

On examination, the nasal cavity on the side corresponding to the disease may be found to be fairly normal, or the mucous membrane may be reddened and somewhat swollen, and an

application of cocaine will usually be necessary in order to make a satisfactory examination. The most constant and important sign is the presence of purulent or muco-purulent secretion, generally a creamy-looking pus in the passage. If the passage be carefully cleansed, the pus will soon reappear again in the middle meatus. The quantity of pus is very variable. In some cases no pus may be seen by anterior rhinoscopic examination, but may be detected by posterior rhinoscopy on the posterior end of the inferior turbinated body, and on the posterior and lateral wall of the pharynx. In certain cases it is only after repeated examination that any pus can be observed. Hypertrophy of the anterior part of the middle turbinal is often present, and the middle meatus is often blocked with hypertrophic tissue and mucous polypi. The constant discharge from the ostium maxillare is the cause of this condition, setting up as it does hyperplastic inflammation of the neighbouring mucous membrane, on the inner surfaces of the middle turbinal, on the ethmoidal bulla and the uncinatè process.

Some bulging of the wall of the antrum in the region of the middle meatus is occasionally observed, by anterior rhinoscopy, in cases of empyema of the antrum. The bulging occurs in the posterior part of the middle meatus where the wall is formed by a double layer of mucous membrane only. Anything of the nature of distension of the bony walls of the antrum, of the facial or palatal walls, is not a symptom of empyema, and should always suggest the presence of a cyst or of a new growth in the antrum.

The *diagnosis* of empyema of the antrum cannot be made with certainty from a consideration of the preceding subjective and objective symptoms. The most important and the only constant symptom is the discharge of pus, forwards or backwards, into the naso-pharynx. By careful rhinoscopic examination this may be traced to the middle meatus, as its source. For this purpose all pus must be carefully removed, and then

if, after waiting some minutes, pus reappears in the middle meatus, we may conclude that it proceeds from one of the sinuses opening into the middle meatus, viz. the antrum, the frontal sinus, or the anterior ethmoidal cells. The question remains from which of these cavities it proceeds. Some indication may occasionally be obtained from the history and symptoms. Again, a discharge of pus from the antrum is apt to be more intermittent than from the frontal sinus or ethmoidal cells, since, owing to the dependent position of the orifices of the latter, the flow tends to be more or less constant, while that from the antrum is affected by changes in the position of the head. In the same way, when the patient's head is bent well forward, and inclined to the healthy side, a free flow of pus into the middle meatus will be more indicative of the antrum as the source of the flow than of the other sinuses. The constant reappearance of pus at the anterior part of the middle meatus, combined with hypertrophic changes of the anterior end of the middle turbinal, is more suggestive of frontal or fronto-ethmoidal suppuration, while the reappearance of pus at a point further back, and the absence of disease of the middle turbinal, is more suggestive of antrum disease. In practice, however, little help can be obtained from these signs, and we have to rely on other methods.

In transillumination we have a valuable diagnostic sign, which, in some cases, at least, may convert a probable diagnosis into one of practical certainty. This method, first suggested by Voltolini, and first introduced into practice by Heryng, has now become a matter of routine in the diagnosis of antrum disease. For the purpose of transillumination the patient is placed in a *perfectly dark* room, and a small electric lamp, specially constructed for the purpose (Fig. 54), is introduced into the mouth, and the patient closes the lips. As soon as the current is turned on, the light is transmitted through the bony wall of the antrum, illuminating the cheeks, and showing a bright crescent of light in the infra-orbital region

on the healthy side, while a dark shadow is present in this region on the side on which the antrum contains pus or a solid tumour. A less striking sign is the illumination of the pupil on the sound side, and not on the affected side. The patient,

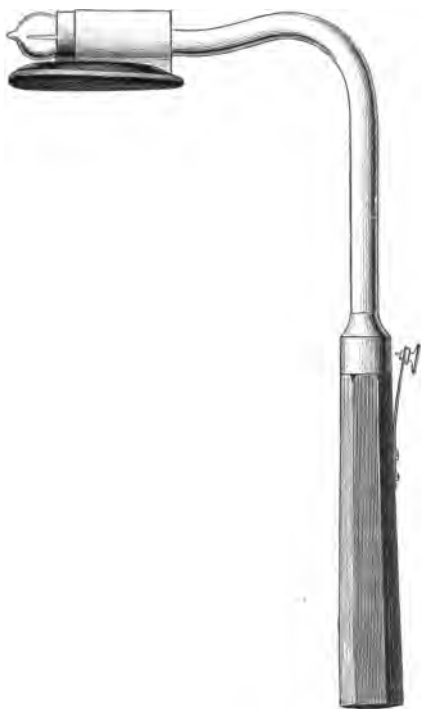


FIG. 54.—Lamp for Transillumination.

too, may experience a sensation of light, much more marked in the eye of the unaffected side.

Although transillumination is a valuable aid in diagnosis, it must be stated that it occasionally fails from various causes, such as the presence of only a very small amount of pus at the time of examination, asymmetry of the antra, or unusual thickness

of the walls on one or both sides. Still, if the other signs and symptoms of sinus suppuration be present, the appearance of a decided dark shadow, with transillumination, may be taken as a certain indication that the antrum is the seat of the disease.

The one method which, in all cases, is most to be relied on for establishing the diagnosis, is that of making an exploratory puncture, and washing out the cavity. The puncture is best made in the inferior meatus of the nose in the manner advocated by Lichtwitz, by means of a specially constructed fine trocar and canula (Fig. 55). The passage should first be cleansed of pus, and the inferior meatus well cocainized to a point more than half-way back. The trocar, the point of which is guarded by the canula, is introduced in an upward and outward direction beneath the inferior turbinated body, as

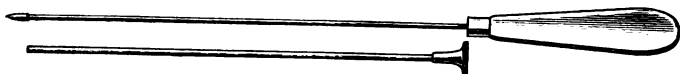


FIG. 55.—Lichtwitz's trocar and canula.

far as the middle of the meatus. The point having reached the part to be perforated, in the upper part of the outer wall of the meatus, about an inch and a half distant from the nasal spine, the canula is drawn clear of the point, and the trocar is pushed through the wall. It is then withdrawn, and a syringe is fitted to the canula, and the antrum is washed out. The puncture is not painful, and there is no danger of troublesome bleeding or other accident during or after the puncture. Occasional difficulty occurs with this method, owing to an unusual thickness of the wall of the antrum. When this happens, an attempt should be made at a point a little further forwards or backwards, and it will be generally found to succeed. When difficulty arises, it is mostly due to the puncture being made too low, where the wall is thick. The point selected should always be close to the roof of the meatus.

Instead of washing out the cavity, some recommend

aspiration, after puncture of the antrum in the inferior meatus. This method presents no advantage over the preceding, and may fail owing to the inspissated character of the pus, or the small quantity present at the moment. In the case of a non-purulent secretion, it is more certain, as a clear secretion might be overlooked in washing out the cavity.

Occasionally an exploratory puncture may be preferably made through the alveolus. Thus, if the extraction of a decayed second bicuspid or first or second molar be indicated, puncture may be made through the socket of the tooth, after extraction. It may also be made in the empty space left by the former loss of one of these teeth. The cavity can be washed out with a syringe provided with a fine tube (see p. 285).

It must be added that the antrum has sometimes been washed out through the natural orifice for diagnostic purposes. This procedure is always difficult, and very often impracticable. If it is desired to attempt it, an endeavour should first be made with a flexible silver probe to find the natural orifice in the groove of the infundibulum. The probe requires to be bent near the point, the curve varying with the anatomical conditions. After cocainization of the parts, the probe is introduced, under good illumination, between the middle turbinated body and the outer wall, the point being directed upwards. As soon as the point of the probe has reached a position about the middle of the turbinated body, it is turned outward, and the opening of the sinus is searched for. When an accessory opening into the antrum is present, it is more easily entered owing to its situation being lower down in the middle meatus. If the passage of a probe is successful, an attempt can be made with a Hartmann's canula, and if this can be engaged in the ostium maxillare or an accessory opening, the antrum can be washed out. As already said, this procedure is always difficult, and very often quite impracticable. It has, therefore, little practical application as a diagnostic method.

Treatment.—Acute suppuration of the antrum recovers spontaneously in a large proportion of cases, and there is, therefore, as a rule, no need for active operative interference during this stage. Local and general remedies may be called for in order to relieve the pain and discomfort. The application of cocaine to the middle meatus sometimes facilitates the exit of pus and so relieves the symptoms. When the onset depends on suppurative, periostitis connected with the root of a decayed tooth, the immediate removal of the tooth is indicated. In certain cases of acute empyema attended with severe and persistent pain, puncture of the antrum from the inferior meatus, with a Lichtwitz's fine trocar, in the manner already described, followed by washing out of the cavity, may be indicated. In general, a case which does not evince decided signs of improvement within three weeks or so, is most likely to become chronic. There is no evidence to show that chronic suppuration, once established, ever gets well without treatment; but very recent cases respond much more readily to treatment than those of longer standing.

As soon as the presence of chronic antrum suppuration has been established a clear indication exists for taking measures to facilitate the escape of pus, which, owing to the unfavourable situation of the natural opening, is liable to retention and decomposition.

Hypertrophied tissue, fungous granulations, and mucous polypi, if present, should be removed. If necessary, a portion of the middle turbinal should be removed with this object. All diseased teeth or stumps which are in any way likely to interfere with the cure of the case should be attended to. One or other of the first or second molars, or of the bicuspid, may be found decayed or loosened. The decayed tooth should be removed, and this may at once give access to the antrum, in which case all that is necessary is to further enlarge the opening. If extraction of the tooth has not given access to the sinus, the cavity will be easily reached by perforating

through the socket of the more external fang with a brad-awl, trocar, or drill. Where no diseased tooth is present, and no gap exists in the site of a former tooth, some have recommended the extraction of a healthy second bicuspid or first molar; but some of the alternative plans of treatment to be presently mentioned should, in such a case, be preferred. In an edentulous jaw the antrum may be reached by perforation of the bone in the line of the alveolar ridge.

An opening into the antrum through the alveolar process



FIG. 56.—Antrum Syringe.

is most easily and rapidly made with a drill worked by a dental engine. It can, however, be perfectly well done with hand-drill or brad-awl. It is generally a very simple operation, if the point of the instrument is carefully directed upwards and slightly inwards towards the floor of the antrum, the direction being guided by taking note of the conformation of the arch of the palate, the depth of the canine fossa, and the size and formation of the alveolar process.

Having once obtained the counter-opening in the alveolar ridge, free irrigation and drainage of the cavity is now possible.

The fluid injected through the opening flows from the nose, bringing away a greater or less quantity of offensive and inspissated pus. The antrum should be washed out, at first twice, and afterwards once daily with a warm solution of boric acid and a suitable syringe (Fig. 56). As soon as we find that irrigation of the sinus ceases to bring away pus, or flakes of mucus, we may omit to syringe for a few days, and if the cavity still keeps free from secretion, we may allow the opening to close. Objections have, indeed, been raised to opening the sinus through the alveolar ridge, on the ground that particles of food and pathogenic micro-organisms from the mouth are apt thereby to enter the sinus. These objections are probably chimerical, and in any case they may be guarded against.

Some cases, especially recent cases, will get well in this manner in a few weeks, and if a sufficiently large opening have been made in the first instance, there will be no difficulty in introducing the nozzle of the antrum syringe during this period and washing out the cavity. If, however, the disease shows a disposition to be more obstinate, which indeed is usually the case, a tube should be fitted into the alveolar opening by a dentist, and secured in the ordinary way. Some prefer to insert a solid obturator, which is removed each time the antrum is washed out.

It is best to use some simple fluid, devoid of all irritant properties, for washing out the antrum. Boric acid solution answers well, or a weak solution of common salt ($\frac{1}{2}$ to 1 per cent.) or merely sterilized water. In cases, however, which continue obstinate after a few months of this treatment, it may be useful to follow the cleansing with some stimulating injection, such as a solution of nitrate of silver or chloride of zinc, commencing always with weak solutions, and gradually increasing the strength. Insufflation, from time to time, of aristol, iodol, euprophen, etc., has also been recommended.

Whatever method we may ultimately adopt, owing to the obstinacy of the case, it is only in exceptional cases, in my

opinion, that any other method than the alveolar opening should, in the first instance, be resorted to. The most cogent reason for adopting some alternative method is, no doubt, the unwillingness to sacrifice a tooth, especially if all the teeth are quite sound.

The alternative methods at our disposal are, attempting to wash out the sinus through the natural opening in the middle meatus ; opening the sinus through the wall of the nose in the inferior meatus ; and, finally, making an opening in the canine fossa. Of these the last is, in my opinion, in all cases to be preferred as the alternative to the alveolar opening.

As regards the method of washing out the sinus through the natural opening, it is no doubt true that in a certain number of cases it is possible to wash out the antrum through a bent canula passed through the natural opening in the hiatus semilunaris, or through an opening which can easily be made through the naturally thin wall just below and behind the hiatus semilunaris, and just above the attachment of the inferior turbinated bone. Hartmann recommends the removal of the fore part of the middle turbinated bone, if necessary, to facilitate the procedure. This method is always difficult, often quite impossible, and in any case the treatment cannot be carried out by the patient. As a means of diagnosis, I do not deny that, in certain cases, this method may be of value, but as a method of treatment in chronic empyema it offers so many obvious objections that it hardly requires to be considered.

The opening in the inferior meatus may be made with Krause's bent trocar, about midway from before back. The point of the trocar should be directed upwards and outwards. The operation may be difficult, owing to a contracted inferior meatus, unusual thickness of the bone, or deformity of the septum. Sharp hæmorrhage has been occasionally met with. This opening is very unfavourably selected for subsequent irrigation of the antrum by the patient himself, and cannot be recommended as an alternative to the alveolar opening.

An opening in the canine fossa is the most satisfactory alternative to the alveolar opening. Into this opening a tube can be fitted. A flange prevents the tube from falling inwards, and the pressure of the cheek upon this is sufficient to keep the tube in position. The opening is conveniently situated for subsequent irrigation by the patient. Some authorities, indeed, recommend this as the best opening to make in the first instance in all cases; but I cannot agree with this, as I believe that the alveolar opening should be selected where it does not involve the sacrifice of a healthy tooth.

When persistent treatment through the alveolar opening in the manner described above does not bring about a cure, further measures may be adopted. The exact period during which we should persist in simple irrigation varies with the case. If after three or four months there is still any considerable quantity of pus, or muco-pus, formed in the cavity, there is little hope of a cure. On the other hand, if there is only an occasional flake washed out, we may continue for twelve months or more in the hope of an ultimate cessation of the disease. Moreover, before urging further measures, and especially any very radical operation, we must recollect that, in spite of much that has been said and written on the subject, there is no method, however radical, by which we can guarantee, with certainty, a successful result, and at the best it may be a long and tedious process.

In obstinate cases I have sometimes succeeded in effecting a cure by packing the sinus through the alveolar opening. For this purpose the alveolar opening is enlarged, and a long strip of iodoform gauze is passed into the sinus with a probe, so as to pack the cavity. Before packing the sinus an attempt should be made to scrape the interior of the sinus with a sharp spoon, although this cannot be very effectively accomplished through an alveolar opening. The packing is removed daily, and the sinus washed out and repacked. This is repeated for a week or two, or as long as the opening continues sufficiently

patent. Afterwards the cavity is washed out in the usual way, until it is found to keep free of secretion. In cases where there is a history of long-continued suppuration, and where, therefore, there is a probability of protracted treatment with simple irrigation, I prefer to commence the treatment by making a large opening at once, and packing the cavity for a time with iodoform gauze. This sometimes leads to a very speedy cure, even in old long-standing cases.

In spite of all our efforts pus formation may continue for years. In such cases a profound alteration of the mucous membrane may be supposed to exist. Abundant granulation tissue may be present, or actual mucous polypi, though these latter are rare. A fragment of necrosed bone, a tooth, or a foreign body, has occasionally been found lodged in the antrum. For the purpose of thoroughly exploring the cavity, and scraping the lining membrane, an opening in the canine fossa is undoubtedly the most favourable.

For this purpose a horizontal incision is made in the mucous membrane at the point of its reflection from the superior maxilla to the cheek. The mucous membrane is then separated from the bone for a sufficient distance, and a portion of the wall is removed with a trephine, or chisel and mallet. The opening should be made sufficiently large to admit of digital exploration, and to enable an inspection of the interior of the sinus to be made with reflected light, or with a small electric lamp introduced into the cavity. It is possible that an anatomical peculiarity, such as the subdivision of the cavity by projecting bony laminæ, may sometimes interfere with free drainage, and thus be the cause of the indefinite prolongation of the discharge. Through a sufficiently large opening these laminæ may be broken down and the fragments removed. The cavity is to be thoroughly scraped out with a sharp spoon and freely irrigated with an antiseptic lotion. It is then packed with iodoform gauze, which is changed daily. The packing is continued for ten or twelve days, after which the cavity is

washed out daily until the wound closes. Closure of the wound should not be allowed to take place for at least a month, but it may require to be kept open for a much longer period, if suppuration persists. For this purpose a tube should be fitted to the opening, and should be continuously worn, as the opening usually exhibits a strong tendency to close.

Scanes Spicer, Luc and others recommend an opening to be made in the inner wall of the antrum into the inferior meatus of the nose, after the cavity has been thoroughly curetted from the canine fossa. If the end of the strip of gauze packing is brought out through the nose, the soft parts over the buccal opening may be brought together with a stitch, and irrigation of the interior can be practised through the nasal opening until a cure is effected. The nasal opening should be made sufficiently large in the first instance, as it tends to contract. Luc employs a rubber drainage tube, the end of which is brought out through the nose, the other end being retained in the antrum by a funnel-shaped enlargement. The buccal opening is allowed to close, and the sinus is irrigated through the tube as long as is necessary. The tube is easily withdrawn when suppuration has ceased.

Although, as already stated, perforating the antrum through the inferior meatus is not a method to be recommended for the treatment of empyema, an opening in this position is nevertheless a useful adjunct to other methods. The natural orifice of the sinus is unfavourable, both from its size and position, to the carrying out of free irrigation of the cavity. In certain cases in which irrigation of the sinus through an alveolar opening has failed to cure, it will be found that the addition of an opening in the inferior meatus, made with a Krause's trocar and sufficiently enlarged to ensure its permanence, will be attended with immediate improvement and ultimate cure.

A point which should always be borne in mind is the possibility of a combined suppuration of other sinuses. The nose should be carefully examined, soon after the sinus has

been washed out, for the presence of pus in the middle meatus. An empyema of the antrum may be rebellious to treatment, simply owing to reinfection by purulent secretion from the ethmoidal cells, or from the frontal sinus.

New Growths in the Antrum.—The antrum is not unfrequently the seat of new growths. Mucous polypi sometimes occur, and they occasionally protrude thence into the nasal fossa through a dilated ostium maxillare. Cysts sometimes arise in connection with the mucous glands of the lining of the antrum. They rarely attain any great size. Cysts originating in the alveolar process in connection with the roots of the teeth sometimes protrude into the antrum. A cyst of this kind may reach such a size as to fill the whole cavity, and may even cause expansion and thinning of the walls of the cavity. The cheek becomes rounded and prominent, and parchment-like crackling of the thin bone may be experienced on pressure. This is the condition formerly described as *hydrops antri*. Although it cannot be denied that a collection of serous fluid, retained in the antrum, through obstruction of the natural orifice, by inflammatory swelling, polypi or other causes, may produce a similar train of symptoms, it seems certain that the vast majority of cases of distension of the walls of the antrum are of cystic origin. Fibromata, osteomata, sarcomata, and epitheliomata may originate in the antrum. By gradual thinning and breaking down of the bony walls the neighbouring cavities may be invaded, and excessive displacement and deformity may result.

2. FRONTAL SINUS.

Acute Inflammation of the frontal sinus may arise from various causes which will presently be mentioned in connection with empyema of the sinus. The onset is marked by more or less fever. The most constant and characteristic symptom is a feeling of fulness or weight, of more or less intense pain in

the forehead, over the region of the sinus. The pain may radiate to the brow or orbits or over the whole head, and is intensified by stooping the head, coughing, sneezing, etc. The pain often assumes a periodic character, being mostly worse in the morning. There may be slight œdema of the skin over the sinus, or on the upper lid. There is a discharge of secretion into the nose which may be serous, mucous, or purulent in character. This discharge may take place continuously, or, owing to swelling about the orifice of the sinus or in the frontal canal, there may be retention of secretion in the sinus, with a free discharge at intervals of one or more days. An abatement of the symptoms usually follows on a free discharge. The complaint usually reaches its height in from five to eight days, and in a large number of cases complete recovery takes place in two or three weeks. On the other hand, a certain number of cases pass into a chronic condition. Occasionally an acute inflammation goes on to perforation of the walls of the sinus in various directions. The treatment of a simple case consists mainly in rest and local and general remedies for relief of pain. Certain measures recommended in the treatment of empyema of the sinus may also be indicated.

Chronic Inflammation of the frontal sinus may be suppurative or non-suppurative. The suppurative variety is that with which we have most often to deal, and empyema of the frontal sinus will serve as the type of both forms of chronic inflammation.

Empyema of the Frontal Sinus.—Causation.—The causes are similar to those of empyema of the antrum (with the exception of the dental causes), viz. acute rhinitis, influenza, and various infectious diseases. The majority of cases result from acute attacks in connection with acute rhinitis and influenza. It is doubtful whether simple chronic rhinitis can set up the disease by extension, but probably it may arise from extension in certain cases of ozœna. Obstacles to the outlet from the sinus, such as swelling of the mucous membrane,

hypertrophies, etc., cannot by themselves be counted as causes of suppuration of the sinus, although they constitute an important factor in preventing acute cases of empyema from undergoing cure, and causing them to pass into a chronic condition. Other causes leading to frontal sinus suppuration are traumatism and tertiary syphilis. The immediate cause, in some cases, is the extension of disease from the ethmoidal cells, which adjoin the infundibulum and floor of the sinus.

Symptoms and Diagnosis.—Suppuration of the frontal sinus is generally present on one side only. Except when the opening leading from the sinus is completely, or almost completely, closed, the main symptoms are a purulent discharge from the corresponding nostril, and more or less pain in the frontal region. Cases with obstruction of the duct and distension of the walls of the sinus will be considered separately.

As regards the discharge, the pus is, on the whole, not so offensive as a rule, as in cases of antrum suppuration. Patients less often apply for relief on account of a purulent discharge than in antrum disease. The discharge is liable to periodical decrease and increase, and patients often state that with a free discharge there is a diminution of the frontal pain.

Pain is a pretty frequent symptom, although it varies very much in intensity and character in different cases and at different periods in the same case. The pain may be of a dull, heavy, or throbbing character. It is usually localized in the region of the sinus, but, when severe, may involve the whole side of the head. It may be much intensified by stooping, coughing, blowing the nose, etc. It sometimes assumes the character of a typical supra-orbital neuralgia, and attacks may recur periodically at a certain hour of the day. A transitory œdema of the upper eyelid sometimes accompanies the supra-orbital pain. Occasionally suppuration of the frontal sinus is attended with very little pain, or pain may be altogether absent.

Tenderness on pressure over the anterior wall of the sinus

is often present, and percussion of this region with the fore-finger will elicit pain and tenderness. Tenderness on pressure is, however, more marked and more constant on the floor of the sinus at the roof of the orbit, and in this situation it will usually be found that specially tender points exist, one at the upper and inner angle of the orbit, and one behind the supra-orbital notch. This tenderness over the walls of the sinus is an important diagnostic sign when present. Some slight thickening of the periosteum or oedema of the soft parts over the bones in these regions may also sometimes be detected.

Anterior rhinoscopic examination reveals the presence of pus in the anterior part of the middle meatus. On wiping this away, pus will usually soon reappear in the same situation. Hypertrophic changes in the fore part of the middle turbinal are common, and the middle meatus may be more or less filled with hypertrophic tissue, or mucous polypi, especially in cases of long standing.

The diagnosis of empyema of the frontal sinus rests on the symptoms already described; the pain, the tenderness on pressure over the walls of the sinus, especially over the floor of the sinus, and the discharge of pus from the sinus into the nose. In certain very latent cases, the purulent discharges may be the only sign of the disease. Since pus appears in the middle meatus in suppuration of the antrum and of the anterior ethmoidal cells, a diagnosis of the source of the pus cannot be made from rhinoscopic examination. Hypertrophies and polypi in the middle meatus occur in all these affections. Suppuration of the maxillary sinus may be excluded by the result of transillumination, or with more certainty by exploratory puncture and washing out through the inferior meatus. It is obvious, however, that if the pus in the middle meatus could be traced to its source in the frontal sinus, this would, in itself, constitute in all cases a certain method of diagnosis, and much attention has been directed to methods for accomplishing this end. Catheterism of the sinus, through the

frontal canal, with a probe, has been performed for this purpose, the flow of pus, following the withdrawal of the probe, indicating its source. The sinus has also been washed out with a similarly constructed canula passed through the frontal canal. Both these procedures are usually difficult, sometimes im-

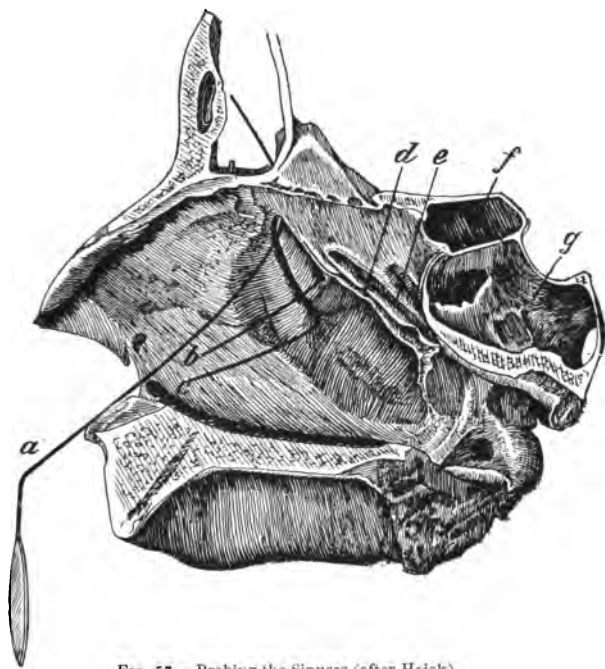


FIG. 57.—Probing the Sinuses (after Hajek).

d. attachment of middle turbinal (removed); *e.* superior turbinal; *f.* posterior ethmoidal cells (opened); *g.* sphenoidal sinus. Probe entering: *a.* frontal sinus; *b.* ethmoidal labyrinth; *c.* maxillary sinus.

possible, and are not devoid of danger. They should, therefore, be undertaken cautiously and only by those skilled in intranasal manipulations.

For catheterism a somewhat slender flexible silver probe is employed. The probe is bent, about three centimeters from

the point, at about a right angle. The angle has to be varied a little in different cases. The middle meatus is well cocainized, and the probe is passed upwards between the anterior end of the middle turbinal and the outer wall of the nose, keeping the point of the probe directed obliquely upwards and forwards, and using gentle manipulation until it is felt to pass into the frontal sinus. When the bent portion of the probe has passed upwards in the proper direction beyond the anterior insertion of the middle turbinal so as to be no longer visible (some two and a half to three centimeters), it is pretty certain to have reached the sinus. In most cases, the removal of the anterior half of the middle turbinal is necessary for catheterism of the frontal sinus. The anterior part of the hiatus semilunaris is thereby exposed, and the probe is thus more easily guided into the infundibulum and thence into the frontal canal. If catheterism of the sinus with a probe is successful, one may perceive a flow of pus to follow its withdrawal, and thus diagnose the source of the pus. More often it will be necessary to pass a slender silver canula, suitably bent, into the sinus, and to wash out the cavity under gentle pressure.

Transillumination of the antrum may aid the differential diagnosis by pointing to the presence of pus in that cavity. Vohsen has shown that in some cases transillumination may be advantageously applied direct to the frontal sinus. For this purpose the electric lamp is covered with a rubber cap, except in front, and the uncovered portion is applied beneath the inner part of the orbital arch, in such a manner as to direct the rays upwards, backwards and inwards, through the floor of the sinus. The procedure is, of course, conducted in a perfectly dark room. A healthy sinus will be lighted up more or less distinctly, while a sinus containing pus will remain dark. Comparison of the two sides may thus show a marked difference. The utility of this method is, however, much diminished by the frequency of asymmetry of the sinuses, and the not unfrequent absence of one or both sinuses.

In the foregoing account, no reference has been made to the cases acute or chronic, in which, owing to impediment to the escape of pus, dilatation or perforation of the bony walls takes place. These cases are not uncommon, and the diagnosis, as a rule, is much more readily made than in cases running a more latent course. Although the canal leading from the frontal sinus is favourably situated, at least in the erect position of the head, for the escape of pus from the sinus, it not unfrequently gets more or less blocked by granulations, in its somewhat long course, or about the lower orifice in the infundibulum. In general, the tendency in such cases is, sooner or later, towards perforation of the walls in a circumscribed area, rather than to a general thinning and dilatation of the walls of the sinus. The most frequent site of perforation is the floor of the sinus, and especially at the upper and inner angle of the orbit. Less frequently perforation takes place in the posterior (cranial) or anterior wall. The symptoms may be very acute, with persistent severe pain, fever, etc., but perforation may occur without any very severe symptoms. When bulging occurs at the upper and inner angles of the orbit, the eyeball is pushed downwards and outwards, and its functions are disturbed in a greater or less degree. Cerebral symptoms and death may result from bursting of the empyema into the cranial cavity.

Treatment.—In empyema of the frontal sinus an important indication is to establish free communication with the nose, as this is almost always somewhat impeded even when there is a more or less constant discharge of pus. The obstruction is, in most cases, situated at the lower end of the frontal canal, in the middle meatus of the nose, or in the region of the infundibulum. In some cases, the mere cocainization of the middle meatus, by reducing swelling of the mucous membrane, produces temporary relief, with a freer flow of secretion. Hartmann recommends Politzer's air-douche to open the communication with the sinus. Hypertrophied tissue should be

removed from the middle turbinal, and the middle meatus should be cleared as far as possible of hypertrophied tissue and polypi. The removal of the anterior part of the middle turbinal may often be performed with advantage (Fig. 41) for the purpose of making this part of the meatus perfectly free and clear. By some or other of these measures, a certain number of cases of empyema of the frontal sinus can be got into a comfortable condition; the patient can be relieved of troublesome symptoms, such as recurring attacks of pain, and the discharge can be materially reduced, rendered less purulent, or it may be completely cured.

Some advise that an attempt should be made to pass a probe into the sinus through the natural orifice, in the manner already described. Irrigation of the sinus has also been recommended through a suitably bent canula passed through the natural orifice. With regard to these procedures it must be remarked that the passage of an instrument through the frontal canal is a difficult and delicate operation, and not wholly devoid of danger. Even the warmest advocates of the method admit that it is possible only in a minority of cases. Even when the sinus can be washed out in this manner the cure is very doubtful, and in any case must be tedious. As a means of diagnosis, in certain cases, the passage of a probe or canula is of value so far as it is safe and practicable; but, under all the circumstances, I consider it has little value as a method of treatment. The same may be said of another method of reaching the sinus through the nose, namely, by perforating the floor of the sinus at the anterior part of the roof of the nose, just in front of the middle turbinated body. At this point the floor is often thin, and may be easily perforated. On the other hand, the bone may be unusually thick and resist perforation. The method is uncertain, and that it is not devoid of danger is proved by a case recently published by M. Mermod.* In this case, after failure to catheterize the sinus through the frontal canal, an

* "Rev. Méd. de la Suisse Romande." 1896.

attempt was made to reach it by perforating the floor of the sinus from the roof of the nose. Death ensued from meningitis, and at the *post-mortem* it was found that the frontal sinus was completely absent on both sides. The probe had entered the cranial cavity.

The only safe and certain method of reaching the frontal sinus is by opening the sinus from the outside. This, of course, is absolutely indicated in all cases where there are signs of retention of pus, and distension or perforation of the walls of the sinus. In latent cases where the prominent symptoms are merely purulent discharge from the nose, and supra-orbital neuralgia, the same operation should be adopted if the symptoms are sufficiently pronounced to demand operative interference, and no sufficient relief is obtained from the intranasal measures already described. In many cases, with slight symptoms, however, attention to the condition of the middle meatus, and regular cleansing of the nose, will relieve the symptoms sufficiently, so that more severe measures will not be required.

If there are signs of perforation, or if the wall of the sinus is bulging at any point, the operation resolves itself into opening the abscess, enlarging any fistulous opening that may be found, or chiselling through the sinus wall at the prominent part. In cases where no external signs are present, the sinus is opened through the anterior wall. For this purpose, a vertical incision may be made in the skin in the middle line. It is better, however, to make the incision transversely along the curve of the eyebrow from the middle line at the root of the nose to the supraorbital notch. Having cut down to the bone, the skin and periosteum are turned back, and an opening is made in the lower part of the wall with a trephine or chisel and mallet. The sinus can then be explored in all directions with the probe. If the sinus is found to be diseased, sufficient bone must be removed to enable the interior of the sinus to be curetted throughout, and attention must be directed to the

extremities of the sinus where separate pockets and diverticula may exist. All morbid granulation tissues must be carefully scraped away. The orifice of the frontal canal and its vicinity must be curetted, and the permeability of the canal established by passing down a suitably curved probe or director, the end of which is brought out through the nose. The canal must be cleared of unhealthy granulation tissue with a fine curette. If thought desirable, the canal should be enlarged by breaking down the bony walls of the neighbouring anterior ethmoidal cells, which, in old-standing cases, are always diseased, thus establishing a very free communication with the nose. The interior of the sinus may be touched throughout with a strong solution of chloride of zinc (40 grs. to the ounce). The cavity is packed with iodoform or cyanide gauze, and the outer end of the wound stitched, leaving an opening for subsequent treatment. The packing is changed every two or three days. As the wound contracts, the plugging may be dispensed with, and the cavity irrigated through the opening until finally this may be allowed to close. Some prefer to maintain a drain in the frontal canal during the course of the treatment; the upper end of the drain projecting from the external wound.

Luc and others recommend immediate closure of the wound after the operation. With this object a large drainage tube is passed from the sinus into the nose, the upper end of the tube being maintained in the sinus by a funnel-shaped enlargement, or it may be held by one of the stitches in the external wound. The sinus can be irrigated through the tube from below, and the tube itself may be withdrawn through the nostril in a week or ten days.

Many operators adopt Kuhnt's method, which aims at obliteration of the sinus by removal of the whole of the anterior wall. The operation gives good results, and if the sinus is not large, the resulting deformity is not great. If the sinus is large, however, this operation leaves an unsightly depression.

In operations on the frontal sinus a good deal of blood

passes into the nose, and it is, therefore, desirable to plug the naso-pharynx at the outset, and so prevent the blood passing into the throat and air passages.

Mucocele, or distension of the frontal sinus with non-purulent fluid, sometimes occurs. It results from occlusion intermittent or permanent, of the naso-frontal duct, and the accumulation of mucous secretion in the cavity. A similar condition may arise from a cyst, developed from a mucous gland. Pain may result similar to that accompanying empyema, and there may be an intermittent discharge of clear fluid from the nose. Dilatation of the walls of the sinus resulting in the formation of an elastic tumour may occur, with corresponding deformity and displacement of the eyeball.

New Growths occasionally develop in the frontal sinus. **Osteomata** may originate here exactly similar in character to those which occur in the nose (see p. 251). In point of fact, they occur more frequently in the frontal sinus than in the nasal cavity. After a period during which violent pains are caused by compression, the osteoma distends and perforates the walls of the sinus, encroaching on the orbit or cranial cavity. **Sarcomata**, mucous polypi, and hydatid tumours have been met with in this region.

3. ETHMOIDAL CELLS.

Acute Inflammation of the ethmoidal cells sometimes coincides with an attack of acute rhinitis. Headache, accompanied by a painful feeling of fulness in the head, tenderness on pressure over the eyeballs, and a very profuse mucous or muco-purulent discharge are symptoms which point to this complication. The inflammation usually subsides with the general catarrhal process in the nasal passages. It may, however, pass into a chronic condition.

Empyema of the Ethmoidal Cells.—The *causation* is the same as that of empyema of the other accessory cavities;

being principally, acute rhinitis, influenza, and the infectious fevers. Syphilitic necrosis of structures of the outer wall of the nose is occasionally the starting-point of the disease. It is sometimes propagated from the neighbouring sinuses, especially the frontal sinus.

Chronic suppuration of the ethmoidal cells is a common disease. Until recently most cases were overlooked or misunderstood. Many cases of recurrent mucous polypi of the nose are really dependent on suppuration of the ethmoidal cells, alone or in combination with empyema of other sinuses. Mucous polypi are a pretty frequent result of chronic inflammation of the mucous membrane covering the ethmoid bone, and this may be set up by the morbid secretion from the accessory sinuses. Pathological changes in the ethmoid bone itself (rarefying osteitis, hyperplastic osteitis) are often associated with suppuration in the ethmoidal cells. These changes may result from extension of inflammation from the mucous membrane to the underlying bone; but, in certain cases, it is likely that the bone is primarily affected by the disease which has started the ethmoidal cell suppuration, for instance, by influenza or some other infectious fever. Hypertrophic bone changes, affecting the middle turbinal, are most commonly observed in association with ethmoidal suppuration, but atrophic conditions are also observed. The pressure of pent-up pus in the cells may lead to circumscribed necrosis of the mucous membrane and the underlying bone. Free communications between neighbouring cells, or between the labyrinth and the nasal cavity may arise in this manner.

Symptoms.—Cases of ethmoidal empyema may be divided into two main classes, viz. the *latent* empyema, in which the secretion has more or less free exit into the nasal cavity, and the *manifest* empyema, in which the pus is pent up, and causes distension of the walls of the labyrinth with external deformity. The former class of cases is much the commoner, and will be considered first.

The symptoms are more or less ill-defined, and the disease often runs a very latent course. As it is often combined with disease of the frontal and other sinuses, it is not always possible to say how far the symptoms are due to disease of the ethmoidal labyrinth or to that of other sinuses. Pain is pretty often present, varying in seat. It may affect the whole head or only the affected side, or it may be located in the root of the nose, the inner part of the orbit, or in the frontal or supra-orbital region. It is usually of a dull character, but it may sometimes be very severe. It may be constant or intermittent, and may assume a neuralgic character. Pressure over the root of the nose, or especially between the eyeball and the inner wall of the orbit, over the region of the lachrymal bone, often elicits pain. A certain amount of dulness of intellect, inaptitude for mental work, or loss of memory is not uncommon in cases in which the disease has existed for some time.

The most constant symptom is a discharge of pus from the corresponding nostril. The pus may have a more or less fetid character. The quantity may be considerable, but varies much in different cases and at different times in the same cases. It has more tendency to dry into crusts in the nose than that proceeding from the sinuses. Stoppages of the nose, from crusts, hypertrophies, and polypi is common. Loss of smell is not an infrequent symptom, especially when the posterior ethmoidal cells are affected, since in this case the olfactory mucous membrane is more or less constantly bathed in pus, and in consequence, undergoes inflammatory changes. A subjective sensation of fetid odour is less common than in antral suppuration. As a good deal of the secretion may pass back through the posterior nares, various symptoms and discomforts may be present as the result of the presence of pus or crusts in the naso-pharynx.

The diagnosis can only be arrived at after careful rhinoscopic examination. Hypertrophic conditions of the middle turbinal, and of the inner wall of the middle meatus, and

mucous polypi are commonly present. A considerable amount of pus or crusts may be present, and these must be removed in order to trace the pus to its source. The pus may be seen in two different regions, depending on whether the anterior or the posterior cells are affected. It will be remembered that the ethmoidal cells open into the nose at two distinct parts. The anterior group of cells opens into the middle meatus; the posterior cells open into the superior meatus. Pus proceeding from the anterior group will therefore appear in the middle meatus, while pus from the posterior group will appear in the olfactory fissure, or may be perceived by posterior rhinoscopy, near the roof of the nose, on the upper surface of the middle turbinal. Often enough pus will be seen in all these situations, both sets of cells being affected. As pus appears in the middle meatus in empyema of the antrum and frontal sinus, and, again, in the olfactory fissure, in empyema of the sphenoidal sinus the diagnosis of ethmoidal empyema cannot be made from the appearance of pus in either of these situations. Neither can any definite conclusion be drawn from the quality or quantity of the secretion, although in the majority of cases, in which the secretion dries into crusts, in and about the middle meatus, the ethmoidal cells will be found to be the seat of the disease. It must also be remembered that in a very large proportion of cases, suppuration of the ethmoidal cells is complicated with suppuration of the maxillary or frontal sinuses.

Suppuration of the antrum may be excluded by exploratory puncture in the inferior meatus or through the alveolus. If suppuration of the antrum is proved to be absent, or if there is a continued appearance of pus in the middle meatus soon after washing out a diseased antrum, this would indicate a further source of pus, which might either be the frontal sinus or ethmoidal cells.

A careful use of the probe is essential in order to trace the pus to its source. With it we also discover the condition of

the ethmoid bone, whether softened or carious. Thus, if the probe (bent near the point, if necessary) be passed into the middle meatus, in the direction of the ethmoidal labyrinth, it may sometimes be made to enter, with little resistance, larger or smaller cavities in the ethmoid bone, the pus proceeding from which may be seen to run down the probe or follow it as it is withdrawn.

As a rule, however, it will be necessary to remove a large portion of the middle turbinal, as well as any hypertrophied tissue and polypi that may be present, before we can trace the pus to its source. If the probe does not enter the cells through openings resulting from disease, or through the softened bone, we may sometimes, after removal of the middle turbinal, etc., trace the pus to the natural opening of the ethmoidal labyrinth. The usual site of this is above the hiatus semilunaris, between the ethmoidal bulla and the line of attachment of the middle turbinal. Through this the probe will pass in a direction upwards and outwards, for a distance of about a centimeter. A flow of pus following the withdrawal of the probe is an indication of its source. The ethmoidal labyrinth, however, may open into the hiatus itself, and if the probe is introduced into this opening, there may be a doubt whether it has passed into the frontal sinus. It must be remembered that, as a rule, a probe which has entered the frontal sinus, passes upwards and slightly inwards to the extent of about two and a half centimeters, whereas in the ethmoidal labyrinth, it passes upwards and outwards only for a distance of about one centimeter. It must be admitted, however, that in certain cases it will be impossible to decide if the source of pus is the frontal sinus or ethmoidal labyrinth, or, as is often the case, both these cavities.

Pus proceeding from the posterior ethmoidal cells, appears in the olfactory fissure between the middle turbinal and the septum. The pus tends to flow chiefly into the naso-pharynx when these cells are affected. By posterior rhinoscopy, it may

be seen on the posterior end of the middle turbinal. The diagnosis has to be made between an affection of the posterior ethmoidal cells and one of the sphenoidal sinus, and the question will be further dealt with when speaking of the latter affection.

Suppuration of the ethmoidal cells is often overlooked or misunderstood. Cases attended with crust formation in the nose are too apt to be set down as simple ozæna, without further examination or inquiry, especially if some atrophy of the turbinals is present. Atrophy of the middle or inferior turbinal is, however, a not infrequent result of chronic ethmoidal suppuration. It is rather important for diagnostic purposes, when crusts are present, not to proceed at once to irrigate the nose, but rather to detach the crusts with a pair of forceps or probe. It will sometimes be found that removal of a crust is immediately followed by a flow of pus, indicating the source from which the secretion proceeds. In certain cases in which, owing to the peculiar conformation of the middle turbinal, the pus is wholly directed backwards, the formation of crusts in the naso-pharynx is the principal sign present. In such cases the true nature of the disease is too often overlooked, and treatment is directed wholly to the site of crust formation in the naso-pharynx. In certain cases, a collection of pus is pent up in a swollen middle turbinal (closed empyema). Depending on the contents, whether mucus or pus, these swellings have been described as mucocele or empyema of the middle turbinal, also as cysts of the middle turbinal. The collection may take place in preformed cells of the middle turbinal unconnected with the ethmoidal labyrinth proper, but in some cases the cavity is continuous with the labyrinth. The distended middle turbinal may cause more or less blocking of the nasal passage, and may be productive of severe neuralgic pains. On rhinoscopic examination, in place of the normal middle turbinal, is seen a large rounded swelling which impinges on the septum, and occupies the

middle meatus. Sometimes the wall is thin and easily perforated with a probe. Mucous polypi are sometimes contained in the cavity. A circumscribed closed empyema of the ethmoidal bulla has been occasionally observed, forming a swelling similar to the above, filling up the space between the septum and outer wall. It is only after opening these swellings and removing a part of the bony wall that an exact diagnosis is made.

Owing to more or less complete obstruction of the outlets of the labyrinth, the cells may become distended with pus (or mucus), and dilatation of the walls may take place. The dilatation may be circumscribed or diffuse. Bulging may take place internally, towards the nasal fossa, or externally through the orbital plate, towards the orbit. Some degree of the former is probably the commoner, but the latter is much more readily perceived, even in a slight degree. These cases of ethmoidal empyema, which make their way towards the orbit (manifest empyema), have long been known, and probably most cases come under the notice of the ophthalmic surgeon. The diagnosis is also easier as, after opening the abscess, a probe can be passed into the labyrinth, or fluid injected into the cavity may find its way into the nose. In many cases there is no fundamental difference between a latent ethmoidal empyema with discharge of pus into the nose, and a manifest empyema with rupture towards the orbit, inasmuch as the latter may be merely a stage of the former. In the course of a latent empyema, the formation of polypi and diffuse hypertrophy may lead to a relative or absolute obstruction to the flow of pus into the nose, whereby a dilatation of the cavity may ensue, especially under the influence of a more or less acute inflammatory exacerbation.

The course of a case with dilatation towards the orbit may be acute or chronic. In the former case the symptoms may set in with fever, rigors, severe pains in the head, and swelling of the eyelids. The eyeball protrudes or is displaced downwards

and outwards. If speedy relief is not brought about by incision or spontaneous rupture of the abscess, the pus may find its way into the cranial cavity and induce a fatal meningitis. On the other hand, the onset may be very gradual—some swelling and infiltration may appear at the inner angle of the orbit, which gradually increase, unattended, however, with any marked pain or other symptoms. The eyeball is gradually displaced downwards and outwards. The symptoms here also may at any stage suddenly assume an acute character.

Treatment.—The first indication, in this as in other sinus suppurations, is to afford the freest possible vent for the flow of secretion into the nose. For this purpose, all polypi and cedematous hypertrophied tissue should be removed. Removal of a portion, or of the greater part of the middle turbinal, is necessary in some cases to effect the object in view. In the process of freeing the middle meatus, the snare, the curette, and various forms of cutting forceps may be brought into use, according to circumstances. This process may require several sittings, but, in most cases, a good deal of this will have been done in making a diagnosis of the exact source of the pus. Not unfrequently after a free removal of all hindrances to the exit of secretions, the discharge of pus gradually diminishes, and a cessation of all the trouble ensues. At all events, it is in any case desirable, after the above procedures, to wait two or three weeks to allow the parts to thoroughly heal up, and to see what, if any, benefit has been obtained. Irrigation of the nose with mild antiseptic solutions should be practised, and benefit may be got from direct irrigation of the region affected by means of a tube with lateral openings passed into the middle meatus. It is especially in recent cases, and those in which the secretion is muco-purulent rather than absolutely purulent, that a more or less complete cure may be hoped for by the preceding measures. In any case, however, in which the discharge of pus has been reduced to a very small quantity, and headaches and other symptoms have been completely cured,

we may fairly consider whether we should not rest content with this, and not unfrequently the patient will feel so far relieved as to decide against any further operative procedure.



FIG. 58.—Hajek's hook and other instruments for opening up the ethmoidal cells.

In bad cases, however, little amelioration will be obtained until the diseased cells have been opened up. The removal of the anterior half of the middle turbinal will almost always be necessary to gain an access to the cells. Various

instruments have been devised—hooks, curettes, cutting forceps, etc. (Fig. 58), for opening up the cells, removing the bony partitions between adjoining cells, and scraping out granulations, and other diseased contents. A Meyer's ring knife is often useful. In this process the diseased bone will be often easily distinguished from the healthy bone by its greater softness and brittleness, and the ease with which it comes away.

A circumscribed empyema occupying a dilated middle turbinal, or other circumscribed dilatation protruding into the nasal passage, should be opened freely, and the bony walls removed piecemeal, and any granulations or polypi scraped out.

In cases which point towards the orbit, an incision should be made over the swelling, and the cells opened. With a curette, both the anterior and posterior cells may be scraped out from this opening, and a free drainage into the nose may be established. In cases also in which the frontal sinus has been opened for suppuration of that cavity, the ethmoidal cells may be safely curetted from the floor of the sinus.

The direct treatment of the posterior ethmoidal cells is more difficult than that of the anterior cells. The whole of the middle turbinal must almost invariably be removed, if indeed this has not been already done in order to make the diagnosis. Hajek recommends his special form of hook as most suitable for opening the labyrinth at this part, inserting it above the attachment of the middle turbinal, and breaking through the bony wall in a downward and forward direction.

Although a complete cure can often be obtained even in bad cases, we must quite as often rest content when we have succeeded in reducing the purulent secretion to a small amount, and in removing other troublesome symptoms which may have been present.

Operative treatment of the ethmoidal labyrinth can be carried out under cocaine anæsthesia, at several sittings at least a week apart. Hæmorrhage, of course, is the chief

hindrance. One must carefully inspect the parts and examine with the probe before beginning, and then proceed rapidly and vigorously so as to do as much as possible at the sitting. The greatest caution must, however, be exercised if one is working in the vicinity of the cribriform plate. Sometimes a general anæsthetic may be employed for operations in this region.

After most of these operations on the ethmoid, it is not necessary, nor is it advisable, to plug the nasal passage. A tampon introduced for ten minutes or so will generally suffice to arrest the hæmorrhage. A loose plug of cotton wool may be worn in the nostrils to keep out dust, etc.

SPHENOIDAL SINUS.

Inflammation of the sphenoidal sinus may be acute or chronic. Acute inflammation of the sinus may occur as a complication of acute rhinitis. It is in the form of chronic suppuration that disease of the sinus is usually met with in practice.

Empyema of the Sphenoidal Sinus is met with alone or in combination with suppuration of other sinuses, most frequently with that of the posterior ethmoidal cells. The causation is similar to that of other sinus suppurations, viz. acute rhinitis, influenza, the specific fevers, erysipelas, syphilis, etc.

Symptoms and Diagnosis.—Pain is often present, especially in acute cases, but it is very variable in seat and character. It may be simply a dull, heavy, diffuse headache, or it may be localized in the occiput, occasionally accompanied by some stiffness of the neck, or in the vertex, or in the supra-orbital or temporal regions. The pain may be of a boring character, or merely a dull pressure; and, again, pain may be completely absent. Giddiness has been sometimes observed. Ocular troubles have been noticed in some cases, such as lachrymation, photophobia, blepharospasm, and transitory scotoma.

Optic neuritis has also been observed. Loss of memory and dulness of intellect may be present.

Not unfrequently the patient seeks advice for the troubles resulting from the purulent discharge from the sinus. This finds its way chiefly into the naso-pharynx, giving rise to the various discomforts which result from the presence of pus or crusts in this region, such as hawking, coughing, etc. Fetor is generally present, and is noticed chiefly by the patient himself. Complete anæsthesia is often present. In many cases of sphenoidal empyema, as in other sinus suppurations, the amount of secretion is liable to variations. Periods of exacerbation occur, lasting days or weeks, during which the secretion is abundant, and after which it diminishes again to a minimum amount.

The general health is often impaired in long-standing cases, and this is largely due to the swallowing of fetid pus. In rare cases, owing to extension of disease to the walls of the sinus, serious complications arise. Complete blindness, exophthalmus, basal meningitis, hæmorrhage from erosion of the cavernous sinus, etc., have arisen in this manner.

The diagnosis can only be made with certainty by careful anterior and posterior rhinoscopy. By anterior rhinoscopy pus will be observed in the olfactory fissure, between the middle turbinal and septum. Crusts may be found in this situation, and these must be carefully removed, and on their removal a flow of pus will often be observed to follow from the olfactory fissure. Sometimes the middle turbinal is closely opposed to the septum, so that no pus can pass down between them. If a small probe, dressed with cotton wool which has been soaked in cocaine solution, be passed up into the fissure, it will often cause the parts to separate sufficiently to allow the pus to trickle down. Hypertrophic changes in the mucous membrane, chiefly that covering the septal aspect middle turbinal, are common. In uncomplicated cases the hypertrophy does not extend beyond the free edges of the septum, towards

the middle meatus. Mucous polypi are rarely present in uncomplicated cases. The mucous membrane of the septum opposite the fore part of the middle turbinal is often swollen and hypertrophied. By posterior rhinoscopy pus may be seen at the vault of the pharynx, close to the margin of the choana, or on the posterior extremity of the middle turbinal. Crusts are often present on the vault and posterior wall of the pharynx and above the margins of the choana. The mucous membrane of the pharynx is often covered with dry secretion (pharyngitis sicca), and more or less atrophied.

In rare cases, in consequence of favourable anatomical conditions, or of destruction or atrophy of the middle turbinal, the anterior wall of the sphenoidal sinus, and even the orifice of the sinus may be actually visible from the front. The diagnosis is much facilitated by such conditions. Pus may be seen issuing from the sinus, and a probe may be passed into the orifice, or the cavity washed out through a small straight canula. Under ordinary circumstances the middle turbinal hides the region from view. It is possible, however, under normal conditions, to succeed in passing a probe into the sphenoidal sinus. It may be said that a probe which passes from the floor of the anterior naris obliquely upwards and backwards across the middle turbinal so as to cross the free border of the latter midway from before backwards, will impinge on the anterior wall of the sinus. The average distance from the nasal spine of the superior maxillary to the wall of the sinus is six to eight centimeters. As the orifice of the sinus lies a little outwards from the olfactory slit, the point of the probe should be bent a little outwards. By carefully feeling about with the end of the probe, one sometimes succeeds in introducing the probe into the sinus. The appearance of pus issuing along the probe, or the feeling of rough or bare bone may confirm the diagnosis. A canula may be introduced in the same way, and pus washed out of the sinus. The removal of the middle turbinal is, however, usually

necessary for carrying out these diagnostic procedures, supposing always that the disease is sufficiently troublesome to require an exact diagnosis to be made, preparatory to direct local treatment of the sinus. The turbinal may be removed, bit by bit, by means of snare or cutting forceps at two or three sittings.

In suppuration of the posterior ethmoidal cells, pus also passes backwards into the naso-pharynx, and downwards into the olfactory slit, so that the diagnosis has to be made between these two conditions. The removal of the middle turbinal is a necessary preliminary in almost every case. Pus from the posterior ethmoidal cells will often flow over the anterior wall of the sphenoidal sinus, giving the appearance as if the pus proceeded from the sinus. After carefully mopping up the secretion, however, it may be possible to satisfy one's self that it proceeds from a point farther forwards. In a case of sphenoidal suppuration, in which, after washing out the sinus, pus re-appeared very quickly in this region, the conclusion would be that a combined suppuration of the sphenoidal sinus and posterior ethmoidal cells existed.

Treatment.—If the existence of the disease has been established, and insufficient relief is afforded by palliative measures, such as nasal washes, antiseptic sprays, etc., direct treatment of the sinus must be undertaken. For this purpose it will almost always be necessary to remove part or the whole of the middle turbinal, if this has not been already done in making the diagnosis of the disease. Having succeeded in passing a probe through the natural orifice, a fine canula may be introduced, and the sinus washed out with a solution of corrosive sublimate (1 in 10,000) or other antiseptic. Although this will give temporary relief, it is nearly always necessary to enlarge the orifice of the sinus in order to obtain permanent results. This may be accomplished with a fine curette, but more effectually by means of Grünwald's forceps, one fang of which is introduced into the orifice of the sinus. If the natural

opening cannot be found, an artificial one must be made by breaking in the anterior wall of the sinus. The bony wall, softened by osteitis, often yields easily.

In recent cases, once the opening is enlarged, the disease sometimes subsides rapidly. The interior of the sinus may be treated by tamponing daily with iodoform gauze, and by various antiseptic applications carried thither with the cotton-holder, or by injection or insufflation. In old-standing cases, and where rough bone is felt with the probe, it may be necessary to remove a large portion of the anterior wall, and scrape out the interior of the cavity with a sharp spoon. In some cases a complete cessation of the secretion may be difficult or impossible to attain. An improvement in the character of the discharge, and a cessation of the more troublesome symptoms may, however, be looked for in all cases.

In certain cases in which the frontal sinus and ethmoidal cells have been affected simultaneously with the sphenoidal sinus, the latter has been opened by working backwards from the interior of the frontal sinus, through the ethmoidal labyrinth.

New growths, such as mucous polypi, osteomata, and sarcomata, have been found to take origin from this sinus. Neuritis of one or both optic nerves, and blindness, have generally been observed among the earlier symptoms of tumours in this region. The proximity of the optic nerve with the roof of the sinus easily explains the frequency of affection of these nerves in disease of the sphenoidal sinus.

PART III.

DISEASES OF THE PHARYNX.

I. ACUTE PHARYNGITIS (*Acute Pharyngeal Catarrh*).

Causation.—Acute catarrhal inflammation, diffused more or less equally over the pharynx, is a common complaint. It is more common in young adults than in children or persons of more advanced life. A predisposition to it is often due to the presence of a chronic pharyngitis or of hypertrophy of the tonsils and adenoid structures of the walls of the pharynx, as well as to chronic nasal obstruction from any cause. Rheumatic subjects are especially subject to attacks of pharyngitis, and acute articular rheumatism is often observed to be preceded by an attack of pharyngitis.

The nature of the connection between acute pharyngitis and acute articular rheumatism is not at present exactly known. It has been frequently observed that at a variable period, of a few days to a week or two, after a sore throat, an attack of articular rheumatism occurs. There is nothing characteristic about the sore throat in these cases; it may be a diffuse pharyngitis, or a catarrhal or follicular tonsillitis, or one or both tonsils may have suppurated. It is at present impossible to say whether such a sore throat is an early manifestation of rheumatism, a true rheumatic sore throat, produced by the same morbid agency which excites the articular symptoms, or whether, under certain circumstances, a sore throat, of whatever character, may give rise to articular rheumatism through the absorption of some morbid material from the throat.

Catching cold is no doubt a common exciting cause of acute pharyngitis, and the disease is certainly commoner when there are rapid changes of temperature. No doubt various pathogenic micro-organisms which are known to be constantly present in the throat, play an important part in the causation of the disease, and cold and other exciting causes, by lowering the vitality, merely prepare the soil for their growth and development. In certain cases the complaint arises by extension of a catarrh from the nose and naso-pharynx. Acute pharyngitis is in some cases a manifestation of septic poisoning, whether by sewer gas, decaying animal matter, or the ingestion of poisonous food. It is also a well-known manifestation of many specific infections, such as those of scarlet fever, measles, r otheln, typhoid, syphilis, etc. Certain drugs, such as iodide of potassium, arsenic, and belladonna, may produce a condition of the pharynx similar to an idiopathic pharyngitis.

Symptoms.—A certain amount of feverishness and general malaise may mark the onset of acute pharyngitis, or these symptoms may be entirely absent in slight cases. Some dryness and stiffness of the throat are soon experienced, and there may be tenderness and soreness under the angle of the jaw and at the sides of the neck. In a day or so the dryness of the throat is replaced by increased mucous secretion, with a tendency to clear the throat by coughing or hawking. The voice is often thick and indistinct, if there is much swelling of the parts. If the naso-pharynx is simultaneously implicated, as is not unfrequently the case, the voice has the characteristic dead character of nasal obstruction, with inability to sound the nasal consonants. There may also be tinnitus, or deafness, from extension of the catarrh to the Eustachian tube. If the larynx participates in the catarrhal condition, there is hoarseness, and a more or less troublesome cough.

On inspection, a diffuse redness of the throat will be seen, which in the early stage is usually most marked on the anterior pillars of the fauces, the soft palate and uvula. Later, the

tonsils and posterior wall are affected. The colour varies from a light red to a dark purplish red, but the intensity of the colour is not a sure index of the severity of the inflammation, since it partly depends on the variable depth of colour of the pharynx in health. The surface is dry, and numerous dilated vessels may be seen on various points. Bright red granules may often be seen standing out on the surface of the posterior wall or lateral folds, composed of inflamed lymph follicles. More or less marked swelling may set in, affecting particularly the lateral folds, the arches of the palate, or the uvula. The tonsils do not swell up to any great size in a simple pharyngitis, the inflammation affecting principally the surface and not penetrating into the crypts. The uvula is sometimes markedly œdematous, elongated, or swollen to the size of a cherry. Much secretion may be present, mucoid or mucopurulent, and often the posterior wall is covered with viscid secretion trickling down from the naso-pharynx. Purulent secretion may be present in the orifices of the lacunæ of the tonsils. Occasionally a fibrinous exudation occurs, which leads to the formation of patches of false membrane in the pharyngeal wall or faucial pillars, and may give rise to a suspicion of diphtheria.

Simple uncomplicated catarrhal pharyngitis usually terminates favourably in from two to six or seven days. Occasionally it may be followed by a subacute or chronic condition, especially in those who have had previous attacks. Pharyngitis arising from septic poisoning, and that associated with the specific fevers, run a course which depends on the nature and severity of the case.

Treatment.—Prophylactic measures include the avoidance of all undue exposure to cold and wet, the wearing of suitable clothing, etc. A daily cold bath, or sponging the neck and chest daily with cold water, is found to be useful as a preventive against taking cold.

A mild attack of pharyngitis needs no treatment beyond

some care as to warmth, and perhaps a day or two in the house ; but in more severe attacks various remedies may be indicated. When the attack sets in with general malaise and fever, or with local symptoms of a more pronounced character, the patient should be confined to his room, or to bed. Tincture of aconite, administered in one-drop doses every hour, will often check the symptoms at the early stages. A mixture containing acetate of ammonia and spiritus ætheris nitrosi may be given every four hours. Benzoate of sodium, in ten or fifteen grain doses every three or four hours, often gives relief, and shortens the duration of the attack.

Locally, a wet compress on the neck is useful at the onset of the attack. Ice to suck, or gargling with iced water, or the application of icebags to the throat, will often be found useful. Later on, warm gargles and steam inhalations are more grateful. A very useful gargle is one containing boric acid and borax (formula 6). If there is great pain in swallowing, cocaine painted on the throat, or sucking a cocaine lozenge before taking nourishment, will be found very useful. Should the uvula become very much enlarged from inflammatory œdematous swelling, it may be advisable to scarify it with a sharp-pointed bistoury, after which it will generally return to its normal size in the course of a few hours.

Towards the termination of the attack, when the acute symptoms have passed off, and a certain amount of chronic catarrh remains, an astringent gargle, or the employment of lozenges or pastilles containing rhatany or tannin, will be useful for restoring the parts to a healthy condition.

II. CHRONIC PHARYNGITIS.

It must be admitted that it is difficult to bring into a simple and continuous clinical description the different varieties of chronic inflammation of the pharynx. Certain regions of the pharynx are more affected, in some cases, than other regions. The anatomical elements of the mucous membrane are not affected to the same extent in all cases; in some the mucous glands are more implicated, in others the adenoid tissue. In some cases the lesions are more superficial, in others the whole depth of the mucous membrane and submucous tissue is affected. Vascular engorgement, connective tissue hyperplasia, hypertrophy, or atrophy, may be present according to the nature and the stage of the morbid changes. On the other hand, since one region is rarely, if ever, the sole seat of inflammation, nor one set of tissues alone implicated, it is scarcely possible to describe separate varieties according to the region or the set of tissue elements chiefly affected. The tonsils alone afford sufficient grounds for separate classification, and certain chronic changes in these parts will be treated in separate sections. In the present section a description will be given of the objective signs and symptoms of chronic inflammation of the mucous membrane of the pharynx as a whole.

Causation and Morbid Changes.—Chronic pharyngitis occurs at all ages, although it presents itself under different aspects in children and in adults. It is commonest between twenty and fifty years of age. During this period of life, the

disease has a greater incidence on the male sex, depending probably on habits and occupation. Cold and damp climates favour its occurrence.

Repeated acute or sub-acute inflammatory attacks of pharyngitis determine after a time a chronic inflammatory state. Specific inflammations of the throat, such as diphtheria, scarlatina, syphilis, etc., have a tendency to set up or increase chronic inflammation.

Chronic pharyngitis is a common accompaniment of long-standing nasal obstruction, whether from chronic rhinitis, hypertrophy of the pharyngeal tonsil (adenoid vegetations), polypi, or other cause. This is accounted for by the fact that the inspired air is no longer warmed, moistened, and purified from dust, etc., in its passage through the nose. Apart, however, from the effects of nasal obstruction, chronic pharyngitis may arise from extension of inflammatory changes from the nasal mucous membrane, or it may be set up by the prolonged passage of morbid nasal or naso-pharyngeal secretions over the pharyngeal mucous membrane.

The free use of alcohol is a common cause of the complaint, and it is often associated, in alcoholic subjects, with chronic gastric catarrh, as well as with hæmorrhoids and other signs of portal obstructions. Excessive smoking must also be set down as a cause. The rheumatic and gouty diathesis, and derangement of uterine functions, are generally considered to be predisposing causes.

Occupation has in many instances a marked influence. Excessive exertion of the voice, as in preachers, actors, singers, etc., has undoubtedly a tendency to produce chronic pharyngitis, though other contributing causes must not be overlooked. Persons who work in a dusty atmosphere, such as millers, stonemasons, and workers in cigar factories, are said to suffer from this disease.

The morbid changes vary with the degree and duration of the inflammatory condition. The epithelial layer is often

thickened, in small areas or over a large extent. The connective tissue is increased more or less, and there is generally marked round-celled infiltration in the superficial layer of the mucous membrane or in the whole depth. In some cases the connective tissue hyperplasia forms the most prominent change, and leads to much thickening of the parts. The soft palate uvula or lateral folds may thus become markedly thickened. The mucous glands are very often enlarged and their ducts dilated. Degenerative changes may also be present in the glandular acini. The vessels are more or less enlarged in chronic pharyngitis, and dilated veins are often visible coursing over the surface, the dilatations sometimes constituting actual varices.

The adenoid structures (lymph follicles) are often hypertrophied, forming elevations of various size, so-called granules or granulations on the pharyngeal wall. In children the enlargement of these structures may be merely a manifestation of a general tendency to hypertrophy on the part of the lymphoid structures of these regions, which is especially shown in hypertrophy of the pharyngeal tonsil (adenoid vegetations) and of the faucial tonsils. Although these granules usually disappear as age advances, they may persist into adult life, without being associated with any general inflammatory condition of the mucous membrane, and without giving rise to any discomfort. Apart from this form of granular pharynx, which, unless the granulations are large and numerous, need hardly be considered pathological, enlargement of the lymph follicles in the posterior and lateral walls of the pharynx, or persistence of this condition from childhood, may result from repeated acute or sub-acute inflammatory attacks, or from a chronic inflammation of the mucous membrane from whatever cause. Pharyngeal granules appear as small prominences of the size of a small split pea, some larger, some smaller, on the surface of the mucous membrane of the posterior and lateral wall of the pharynx. Sometimes the lateral folds of the pharynx are

covered with granules, and greatly thickened thereby. These granules are composed mainly of lymphoid tissue, diffuse and follicular, and through the substance of the granule is usually found passing the dilated duct of a mucous gland.

Finally, after the disease has existed a variable time, atrophy sometimes gradually takes place, both of the mucous glands and the lymphoid follicles. The epithelial layer becomes thinner. The fibrous tissue contracts, the blood-vessels are diminished, and the mucous membrane becomes thinned throughout, presenting in places a pale, almost cicatricial, appearance. Although a chronically hypertrophied pharyngeal mucous membrane may thus undergo atrophy, there is no proof that an atrophic condition is always preceded by a hypertrophic stage.

Symptoms.—The symptoms of chronic pharyngitis vary considerably in kind and degree, and do not bear a very constant relation in either of these respects to the morbid changes present. In some persons very marked changes may be present without occasioning any inconvenience, while in others a long train of troublesome symptoms is associated with very slight departure from the normal condition. A great deal, indeed, depends upon the individual; persons whose nervous system is over-sensitive suffering, as a rule, more than others. In a general way the symptoms will often be found to bear a relation to the quantity of the secretion and its nature, whether tenacious or otherwise, to the amount of granulations present, and the degree of hypertrophy of the lateral folds of the pharynx, and perhaps to the size of the uvula. In many cases of chronic pharyngitis the symptoms are not constant, but reappear at longer or shorter intervals, with the repetition of sub-acute inflammatory attacks, to which these patients are subject, although, if the attacks are frequent, the symptoms tend, more and more, to continue during the intervals.

In some cases, especially where the affection is slightly marked, there is simply an uncomfortable feeling in the throat,

and a tendency to clear it, these symptoms being marked chiefly or perhaps solely in the morning. The presence of secretion may cause a constant tendency to cough and "hem," in order to clear the throat. If the secretion is viscid it may give rise to very troublesome hawking and other noisy expiratory efforts, usually most marked in the morning, and may even lead to retching. This latter symptom is often noticed in alcoholic subjects.

A great variety of uncomfortable sensations are complained of by patients suffering from chronic pharyngitis. Pains in the head or back of the neck are sometimes complained of. Pain in the throat is sometimes present, and may be of a burning, shooting, or pricking character, spontaneous, or evoked by acts of swallowing or coughing. Actual pain is, however, more frequently confined to periods of sub-acute inflammatory exacerbations, and the feelings complained of are more usually burning, tickling, itching, stiffness, or dryness. Sometimes the sensation is vaguely described as "oppression in the throat." A dry feeling is a pretty constant symptom in the so-called pharyngitis sicca, but the feeling is by no means always accompanied by actual dryness of the pharynx. Sometimes there is a feeling of a foreign body in the throat, which may be compared to a hair, a bone, a needle, etc., and may give rise to constant efforts to dislodge it by coughing, "hemming," or hawking.

Cough is sometimes a symptom of chronic pharyngitis, and it is perhaps especially associated with the granular variety. The cough varies in character. Sometimes it is merely an occasional cough to clear the throat. Sometimes it is a troublesome, hacking, dry cough, and it may be almost incessant, ceasing however in sleep. An elongated uvula sometimes gives rise to a constant irritating cough.

A frequent and prominent symptom of chronic pharyngitis, especially of the granular condition, is some trouble with the voice. Either the voice is easily fatigued with speaking or singing, or it tends to become husky, or there is merely

inability to reach the higher notes. Sometimes the use of the voice leads to painful sensations in the throat and neck. These various symptoms are, of course, chiefly prominent in those whose profession necessitates a constant or prolonged use of the voice, whether in speaking or singing. It is, however, to be remembered that the morbid changes in the pharynx are far from being in any constant relation with the amount of trouble experienced by the patient in using the voice. It is possible to understand how certain marked changes in the pharynx can affect the voice, quite apart from any extension of catarrh to the larynx. A very granular, uneven condition of the wall of the pharynx renders it an imperfect reflector for the sound-waves which strike against it as they flow out from the laryngeal orifice, and so to some extent the sound is dulled. Thickening of the posterior pillars of the fauces and hypertrophy of the lateral folds, interfere with the proper movement and vibration of the soft palate, and diminish the resonance. In these ways increased effort is evoked in the production of the voice. In many cases, however, in which symptoms are marked, the objective signs are slight, and it seems necessary to suppose some nervous connection to account for the symptoms. It will undoubtedly often be found that the nervous condition of the patient and his general health have much to do with the voice troubles associated with pharyngitis.

In persons of a certain nervous disposition there is often a great amount of anxiety about the throat symptoms which they experience. Depression of spirits and ideas of cancer and consumption may be developed, and such persons become true throat hypochondriacs. Here again the local signs are often slight and not at all in proportion to the mental effects, and although local treatment in some cases produces good results, in others, and I think the greater number, it only seems to aggravate the distress by concentrating the mind upon the throat.

Owing to extension of catarrh to the larynx or Eustachian

tubes, a certain amount of laryngitis, with consequent hoarseness, or ear troubles, such as tinnitus, deafness, giddiness, etc., may complicate chronic pharyngitis. Chronic laryngitis is a particularly frequent accompaniment of a pharyngitis which is attended with dryness of the mucous membrane.

On inspection of the throat in chronic pharyngitis, the appearances vary much in different cases according to nature and degree of the changes present and the tissues and parts which are chiefly affected. In certain cases the appearances are chiefly those of a diffuse catarrhal condition. More or less marked redness of the posterior wall, pillars of the fauces, tonsils, and soft palate will be observed. On the surface of the posterior wall of the pharynx, and still more upon the soft palate, numerous small glistening elevations will often attract attention. These are formed by the hypertrophied mucous glands and their excretory ducts distended with mucus. The presence of an excess of mucus on the surface is a very common sign, but one which a more cursory inspection will not always demonstrate. It is necessary to pass a little mop of cotton-wool fixed on the end of a holder over the surface of the mucous membrane. If this be done, it will often be found that the posterior wall of the pharynx, which merely presents a moist, glistening aspect, is really covered with an abundant viscid covering of transparent mucus.

Larger elevations, which are to be distinguished from those just mentioned, are often seen on the back and sides of the pharynx, the so-called granules. These granules, composed as already said of lymphoid tissue, vary in size, from a hemp seed to a split pea, or larger, and are usually of a somewhat deeper red colour than the surrounding mucous membrane. They are rounded or oval in shape, the long diameter being vertical. They may be isolated, or in groups, or may be confluent so as to cover a considerable surface, or form vertical ridges at the sides or centre of the posterior wall.

The importance of these granules has sometimes been

overrated. They are, like the pharyngeal tonsil, relatively more developed in childhood, and tend to disappear as age advances, but they may persist into adult life without constituting a morbid condition, their size and number not being excessive, and there being no evidence of inflammatory changes in the granules themselves, or in the mucous membrane around. On the other hand, their persistence is often the result of inflammatory processes in the pharynx. They are a noticeable feature in many cases of chronic pharyngitis, and they may be present in sufficient volume and numbers to constitute the chief feature of the case (granular pharyngitis).

In some cases of chronic pharyngitis, a general thickening of the mucous membrane is the most prominent feature (hypertrophic pharyngitis). In these cases, on inspection, the pharyngeal cavity appears of diminished size. The pillars of the fauces may be much thickened, and the whole soft palate thick, flabby, and unduly dependent. The uvula may be much thickened and elongated, and the mucous membrane at its apex may hang down like an empty sack. In certain cases the lateral folds of the pharynx are especially thickened — the so-called lateral hypertrophic pharyngitis. The thick, swollen bands may be seen immediately behind the posterior pillar of the fauces on each side, and become very apparent in the reflex contraction of the pharyngeal muscles, which sometimes occurs when the tongue is depressed. They are continued up into the nasopharynx as thickened salpingo-pharyngeal folds, and downwards on the lateral wall to the insertion of the posterior pillar of the fauces, or as far as the level of the epiglottis. As a rule this hypertrophy of the lateral folds is accompanied by a general hypertrophic thickening of the mucous membrane, but sometimes they are the only parts affected. The posterior pillars are usually simultaneously implicated. There may be adhesions between the lateral folds and posterior pillars. The hypertrophy may be more marked on one side than on

the other. In some cases the thickening of the lateral folds is due to hypertrophy of the mucous membrane and submucous tissue, in other cases it results from the development of numerous granules upon the surface, or the two conditions may be combined.

Not unfrequently we meet with cases in which the surface of the mucous membrane presents a dry appearance—the so-called *pharyngitis sicca*. The surface of the pharynx is dry, being covered with a thin, varnish-like coating of dried mucus. In some of these cases there is thickening of the mucous membrane present, in others there is obvious atrophy. In certain cases we have, no doubt, to deal with a chronic pharyngitis, mostly of long standing, in which degenerative changes in the mucous glands, or actual atrophy has taken place. The secretion is diminished, perhaps altered in character, and tends to dry rapidly on the surface. In many of these cases a similar dry condition of the nose is also present. According to some observers, *pharyngitis sicca* is especially frequent in subjects of diabetes and Bright's disease.

Sometimes larger masses of dried mucus, or muco-purulent secretion, will be found adherent to the surface. Such masses can always be shown to proceed from the naso-pharynx, and they may originate in the nose. The secretion trickles down the pharyngeal wall, and tends to dry rapidly on the surface, partly from its nature, and partly, in some instances, from the conjoined influence of mouth-breathing, which causes a current of imperfectly moistened air to impinge directly on the buccal pharynx. In some cases a dry pharynx is associated with atrophic rhinitis, and in these cases the mucous membrane of the pharynx is often obviously implicated in the general atrophic process. The parts in these cases are generally paler, the mucous membrane decidedly thinned, although a few small granules may persist on the posterior wall, and stand out in contrast to the general wasting. The pillars and soft palate are thin, the uvula thin and almost

threadlike. It seems as if the muscular structures take part, in these cases, in the general atrophic process.

Treatment.—Whenever chronic pharyngitis is associated with chronic nasal catarrh or nasal obstruction from any cause, it is necessary, as far as possible, to remedy such condition before any effectual benefit can be obtained from treatment of the pharynx. Hypertrophy of the pharyngeal tonsil, or hypersecretion from its recesses, must, if present, be treated in the usual manner.

The free use of alcohol must be forbidden, especially when the complaint is connected with symptoms of portal obstruction. In such subjects a suitable diet must be prescribed, and the bowels must be carefully regulated. A dose of sulphate of soda, or Carlsbad salt in a tumbler of hot water, taken about an hour before breakfast, will be generally found useful. Tobacco-smoking may have to be limited or entirely cut off, and dusty atmospheres must be avoided. In cases where there is reason to believe that the complaint is dependent upon, or aggravated by, the excessive use of the voice, rest of the voice must of course be prescribed.

The general health must in all cases be attended to. As already remarked, the subjective sensations are often out of proportion to the local changes, and the general state of health, especially of the nervous system, will often be found at fault in such cases. It is probable that the reputation of certain health resorts, and mineral water cures, in chronic pharyngitis depends chiefly on this fact. In any case, a change to a bracing place will often be found useful, while such resorts as Aix-les-Bains, Weilbach, Ems, and Mont Dore, among others, have been especially recommended for the treatment of pharyngitis. Daily cold sponging of the neck, or of the neck and chest, followed by a brisk rub with a towel, will often be found useful.

The main treatment, however, in the vast majority of cases, is local. In cases where the throat is moderately congested, and the soft palate and uvula relaxed, a mild astringent

treatment is indicated. This may be carried out according to circumstances by means of gargles, sprays, or lozenges. A gargle, such as formula 11, may be ordered two or three times a day, and is generally best used cold. It must be remembered that most people in gargling do not bring the fluid in contact with the throat further back than the anterior pillars of the fauces. However, in cases where the uvula and soft palate are affected, these parts are always sufficiently reached. Astringent solutions (formula 11) may be applied as sprays. Rhatany and krameria, as pastilles or lozenges, are most generally employed, the lozenge to be slowly sucked four or five times a day.

In cases where a sub-acute inflammatory exacerbation is present, as well as in the numerous cases where there is an excess of viscid secretion in the throat, gargles, consisting of alkaline or neutral saline solutions, will often be found more beneficial (formulæ 1 to 7). These gargles are generally more advantageous and agreeable when used slightly warm. This is best managed by ordering the saline substance in powder to be added to half a wine-glass of warm water, or a solution of double or treble strength, which can be diluted with warm water at the time of using.

In many cases we must have recourse to direct applications to the throat, in order to produce any permanent improvement. It may be generally desirable, if a coating of viscid mucus is present, to get rid of this before making applications to the throat. This may be done by the use of an alkaline gargle, or by wiping the surface with a mop of wool soaked in a solution of bicarbonate of soda or borax. Among local applications, in chronic pharyngitis, glycerine of tannin, nitrate of silver solution (10-40 grs. to \mathfrak{z} i), or chloride of zinc (20-40 grs. to \mathfrak{z} i), repeated daily or at longer intervals, will be found beneficial. Iodine is a very useful local remedy in most forms of chronic pharyngitis, especially the granular and hypertrophic forms. It is best applied in the form of the iodoglycerine solution (formula 13), although watery solutions are

also useful. The weaker iodo-glycerine solution should be used at first, and if it is well borne the stronger solution may be employed. A daily application should, if possible, be made at first. Afterwards, when the stronger solution is used, every second or third day will suffice. In obstinate cases the best effect will be obtained from application of the iodine solution, with brisk friction by means of a dossil of wool fixed at the end of a holder. M. Ruault recommends, as the most effectual treatment of granular pharyngitis, the application of a very strong watery solution of iodine (formula 14). This solution he applies briskly, after previously anæsthetizing the surface with cocaine, by means of a brush with short stiff hairs. A superficial eschar forms on the surface so treated, which separates after a few days. The application is repeated every eight or ten days, over a period of four or five weeks. A good deal of pain and discomfort follows this application, which may last twenty-four or thirty-six hours.

If, in spite of astringent applications, the uvula remains elongated and appears to be the cause of troublesome cough, it may be necessary to amputate a portion. This can be done by seizing the end in a pair of forceps and cutting it off—a portion, not the whole uvula—with a pair of curved, blunt-pointed scissors. The uvula should be painted with cocaine first, and then the operation is practically painless. Some soreness, however, will be experienced for a day or two. A little ice may be sucked immediately after the operation, and a boric acid gargle used occasionally until the wound is healed.

Where the granulations are very large, or where they constitute the chief lesion to be treated, it is often desirable to destroy the granulations by the direct application of some strong caustic remedy to them. Of the chemical caustics, chromic acid is the best. A minute portion of the deliquescent crystalline acid may be taken up on the end of a probe and carried to the required spot. After applying the caustic, the patient should gargle with, and, if necessary, swallow, some

alkaline solution, so as to prevent the action on the surrounding parts. Only a limited surface should be treated at each sitting. The electric cauterly is, however, the best means of destroying granulations. For this purpose, a cauterly ending in a small, flattened point should be applied to each granulation, or, when they are very large or confluent, the surface must be cauterized at several spots close to each other. Only a certain amount of surface should be cauterized at one sitting, and a week or so allowed to elapse for the eschars to separate before repeating the operation. The hypertrophied granular lateral bands are to be treated in a similar manner, but a flat spatula-shaped cauterly, bent at a right angle, will often be found more suitable for the lateral bands. The pain and reaction after cauterizing the lateral bands are more marked than is the case with the posterior wall, chiefly on account of the greater movement of these parts. It is well, therefore, to do only one side at a sitting.

Before using a caustic, especially the electro-cauterly, the part should be painted with a twenty per cent. solution of cocaine. While the surface is healing, a boric acid gargle should be used three or four times a day.

In pharyngitis sicca, frequent cleansing and moistening by means of a gargle or spray of some alkaline or saline solution gives relief. A spray of liquid paraffin frequently repeated is sometimes useful. McBride recommends the vapor creosoti (creosote, m. 80; magnes. lev., gr. 40; aq. \mathfrak{z} i, a teaspoonful to a pint of water at 140° for each inhalation) as one of the best means of relieving the discomfort. Painting the mucous membrane with iodo-glycerine solution will be found very beneficial. In this condition the stronger solutions will be more easily borne. Pharyngitis sicca is so often complicated by a morbid condition in the naso-pharyngeal and nasal cavities, that treatment must generally be directed simultaneously to these regions. There are few cases, in fact, of dry pharynx that are not benefited by a daily use of a collunarium consisting of a warm alkaline or saline solution (formulæ 1, 2, 3).

III. ACUTE TONSILLITIS.

In acute pharyngitis the tonsils participate in the general catarrhal inflammation. Sometimes catarrhal inflammation is chiefly confined to the tonsils. The mucous surface is reddened, and the tonsils more or less swollen, constituting an acute catarrhal tonsillitis. This may be said to be the simplest and mildest form of tonsillitis, and the symptoms and treatment do not differ sufficiently from a mild lacunar tonsillitis or catarrhal pharyngitis to require special description. The attack runs a course of a few days. The onset is often abrupt, and the fever moderately high. There is sometimes only slight discomfort in the throat, and in children the nature of the attack is apt to be misunderstood, and the fever attributed to various other causes unless the throat is inspected.

There are two other kinds of acute inflammation affecting the tonsils, which will need special description, viz. the so-called follicular (lacunar) and the phlegmonous forms. Although *the different forms of tonsillitis are sometimes associated together, and one form sometimes proves to be merely the early stage of another*, the classification just mentioned is conveniently adopted, and in practice most cases of acute inflammation of the tonsils can be readily referred to the catarrhal, the lacunar, or the phlegmonous variety. However, I have no doubt that this classification is only provisional, especially as regards the designation lacunar or follicular tonsillitis, which probably, as at present employed, includes more than one variety of the disease.

1. ACUTE FOLLICULAR TONSILLITIS (**Acute Lacunar Tonsillitis, Infectious Tonsillitis**).

Causation and Nature.—A condition of chronic hypertrophy of the tonsils, or of chronic dilatation of the crypts associated with retention of their contents, forms undoubtedly one of the strongest predisposing causes of this disease. The disease is common in children, more common still in young adults, and becomes more rare after forty years of age. Certain individuals evince a peculiar predisposition to the complaint, and suffer from repeated attacks, but this predisposition will in most cases be traceable to the condition of the tonsils themselves.

Catching cold seems in some cases to be the immediate cause of an attack of this, as well as of other forms of tonsillitis. Follicular tonsillitis has been repeatedly observed as a result of operative procedures in the nose, but especially of applications of the galvano-cautery. Whatever be the exact nature of its connection with rheumatism, it is an undoubted fact that an attack of rheumatic fever will sometimes be observed to follow closely upon an attack of follicular tonsillitis. The same remark applies equally to simple catarrhal tonsillitis, or pharyngitis, either of which may be sometimes observed to precede an attack of articular rheumatism (see p. 316).

Follicular tonsillitis, both in its course and relationships, partakes in many ways of the nature of an acute infectious disease. Whether the disease spreads by contagion from one individual to another is perhaps an open question, but there are many facts which favour this view. It certainly occurs sometimes in an epidemic form, and several cases will occasionally break out in the same house. In some cases the disease is pretty clearly traceable to drain-poisoning. It is often observed to prevail in association with epidemics of scarlet fever and of diphtheria. Indeed, it seems to have a very close relationship with both these diseases. Persons

who have been exposed to the infection of scarlet fever or diphtheria are sometimes observed to develop a follicular tonsillitis instead of either of these diseases. Of course a follicular tonsillitis developing under such circumstances would be viewed with suspicion, especially in the case of diphtheria. Recent observations have shown that diphtheria not unfrequently presents all the appearances of follicular tonsillitis, and without a bacteriological examination the diagnosis could not be safely made.

It is pretty certain that the term follicular or lacunar tonsillitis includes more than one variety of the disease. The cases which, from their general resemblance in clinical aspects, are included under this designation, are probably not all identical in their nature. Different varieties seem to exist, each variety being possibly determined by a different micro-organism or association of micro-organisms. It is not, however, possible at present to classify these different varieties.

In follicular tonsillitis the tonsils are inflamed and swollen, and the mucous membrane of the pharynx participates more or less in the process. The most important and characteristic anatomical change consists in an enormous increase in the transudation of leucocytes to the surface, and these are principally poured into the cavities of the lacunæ, whence they exude through the lacunar orifices. The characteristic local sign is the formation of whitish deposits on the tonsils, situated in and around the orifices of the lacunæ. These deposits vary somewhat in colour and consistence, being white, grey, or yellowish in appearance, and are, as a rule, soft and pultaceous in character, though in certain cases the deposits are somewhat firm and membranous. The deposits are composed of leucocytes with some epithelial cells; in some cases fibrinous flakes are also present, while in others again the structure consists of a distinct network of fibrinous fibrillæ enclosing numerous leucocytes in their meshes (pseudo-membranes). Although these marked differences are met with in

the composition of the deposit on the tonsils in follicular tonsillitis, no classification can at present be based on the character of the deposits, as undoubtedly every gradation exists between the different kinds, and the pultaceous non-fibrinous deposits may be associated in the same case with those of a fibrinous character. Besides leptothrix and various cocci, there have been found present the streptococcus pyogenes, the staphylococcus albus and aureus, the pneumococcus, and other micro-organisms. So far as is at present known it would seem that the streptococcus is the most frequent cause of the disease, but whether different varieties depend on different micro-organisms, and, if so, what are the clinical characters of these different varieties, has yet to be exactly determined.

Symptoms.—The attack begins usually rather suddenly, sometimes gradually, with general malaise and fever. Marked shivering may usher in the attack. The temperature generally rises, in the course of from twelve to thirty-six hours, to 102° or 103° , and often, especially in children, reaches 104° , or more. About the same time that the general symptoms set in, or shortly after, soreness is felt at one or both sides of the throat, generally at one side first. The soreness gradually increases, and swallowing may become very painful. Even movement of the neck may, in bad cases, cause pain. Shooting pains in the ears, or deafness and tinnitus, may be present. If the tonsils are swollen to a large size, the voice will be thick and indistinct. The breath is generally offensive, and the tongue coated with a thick creamy fur. Some delirium or wandering at night is not uncommon, especially in children. Slight transitory albuminuria is occasionally present. The glands at the angle of the jaw, especially at the side most affected, are almost invariably swollen and tender to the touch at the height of the attack.

On the third, fourth, or fifth day, rarely later, the symptoms all abate rapidly. The temperature falls to normal, sometimes

falling four or five degrees in twelve hours. The soreness of the throat and dysphagia, as well as the local signs, disappear, and convalescence is established.

If the throat be inspected at an early stage, one or both tonsils will be found to be red and somewhat swollen, the swelling being most marked in cases where the tonsils were previously enlarged. Some redness and inflammation of the faucial pillars and to a less degree of the posterior wall of the pharynx will also be observed. Very early, it may be even on the first day, greyish or yellowish-white patches are seen on one, or more often on both tonsils. These will be found to be situated in and around the orifices of the lacunæ, sometimes at one or two orifices only, sometimes at several, or all the orifices. The patches are roundish in shape, or triangular, or of an elongated linear form, corresponding with the shape of the openings of the lacunæ. In the course of the case these whitish patches may become larger, extending beyond the region of the lacunar orifices, and leaving less of the red mucous membrane visible between them; and adjacent patches becoming more or less confluent, a considerable surface of one or both tonsils may, in certain cases, become covered with a dirty greyish deposit. The deposit can usually be wiped from the mucous membrane without much difficulty, though occasionally it is firmer and more adherent, and a slightly bleeding surface may be thereby exposed. Pressure upon the tonsil, in the vicinity of a lacunar orifice, will often cause a certain amount of similar greyish or yellowish-white material to exude from the cavity of the lacuna.

This whitish deposit, which collects within the lacunæ and at and around their orifices, is the characteristic local sign of the disease under consideration. Practically this appearance remains confined to the tonsils; but occasionally, in the course of the case, greyish-white masses may appear on the posterior wall of the pharynx and on the soft palate, resembling more or less those on the tonsils, and consisting of mucus, desquamated

epithelium, and pus corpuscles. These masses are more easily wiped off the surface than the patches on the tonsils.

Both tonsils are usually affected in lacunar tonsillitis, and often to an equal extent. Frequently, however, one tonsil is less implicated, or is even altogether free. In the latter case the unaffected tonsil may become implicated as the symptoms are abating; and this occurrence is attended with exacerbation of the fever and other symptoms, for two or three days.

If the pharyngeal tonsil be examined with the rhinoscopic mirror during the course of an attack of follicular tonsillitis, it will not unfrequently be observed to be more or less swollen and to present similar whitish patches at the orifices of the lacunæ. The same is true, though less frequently, of the lingual tonsil.

Follicular tonsillitis, however severe the local and general symptoms may be, usually terminates, within a week or so, in recovery without the occurrence of any complication, although the patient may be left somewhat weak and prostrate after a severe attack. Occasionally it happens that on the abatement of the symptoms one or other tonsil becomes painful again, and an abscess (tonsillar or peritonsillar) is developed, which runs the usual course. In rare cases complications have been observed of a more or less grave character, some of them indicating a general infection of the system. Among the complications which have been observed from time to time, either in the course or at the termination of acute lacunar tonsillitis, may be mentioned suppuration of the cervical glands, purulent otitis media, erythema multiforme, erythema nodosum, inflammation of serous membranes (pleura, pericardium, peritoneum), and ulcerative endocarditis. Orchitis and ovaritis have also been observed. The occasional occurrence of transitory albuminuria has already been mentioned, but acute nephritis has also been recorded.

Although, in the majority of cases, the diagnosis of this complaint presents no difficulty, yet in certain cases there may

be considerable difficulty in distinguishing it from diphtheria. A consideration of the following points will aid the diagnosis in doubtful cases, but no one of them can be said to do more than point in one direction or the other, as there is none to which exceptions may not occur. The onset of acute follicular tonsillitis is usually sharply marked, while that of diphtheria is more often gradual. High fever on the first or second day is thus more characteristic of tonsillitis. On the other hand, a normal or only slightly elevated temperature, especially if combined with feeble pulse and symptoms of general depression, is suggestive of diphtheria. The exudation in tonsillitis is limited to the tonsils, and appears at several points corresponding to the lacunar orifices, and only in some cases by coalescence of these patches is a large surface affected. The exudation in tonsillitis is more easily separated from the tonsil, and is softer and more friable. It is not so distinctly membranous in character, and cannot be removed in strips of any size. Though some swelling of the glands is associated with tonsillitis, and occasionally very marked swelling, still the latter condition is more indicative of diphtheria. The presence of albuminuria points to diphtheria rather than to tonsillitis.

It must be confessed that in spite of the greatest care it is sometimes impossible to make the diagnosis from the clinical aspect of the case. Not only do cases of tonsillitis simulate diphtheria, so as to be mistaken for it, the commoner mistake, but diphtheria may simulate the aspect of lacunar tonsillitis, and so be regarded as such, a less common but more serious mistake. It is not only at the onset that diphtheria may be mistaken for tonsillitis, but there is plenty of undoubted evidence that it may run a very rapid and benign course and maintain the appearance of tonsillitis throughout. There is indeed no absolutely certain means of differentiating the diseases in some cases except bacteriological examination. When, therefore, there is any reasonable doubt as to the diagnosis, a sterilized swab should be rubbed over the

exudation, and a bacteriological examination should be made. Since simple follicular tonsillitis is very probably an infectious malady which may be transmitted from one person to another, it is only prudent, so long as there is doubt, to recommend isolation on this ground, and thus the dangers connected with a possible erroneous diagnosis are sufficiently guarded against.

Treatment.—In all cases where chronic enlargement or disease of the tonsils is associated with recurring attacks of follicular tonsillitis, the removal of the tonsils is very strongly indicated in the interval between the attacks. Where excision is not consented to, or is not indicated by the size of the tonsil, other less radical treatment, such as is described in the sections on hypertrophy of the tonsils and chronic lacunar tonsillitis, may be resorted to. In the event of frequent outbreaks of tonsillitis occurring in the members of a particular household, the possibility of drain-poisoning should suggest itself. During an attack of lacunar tonsillitis the patient should be confined to bed. The condition of the bowels, which are generally constipated, should be regulated. The diet should be of a light character, chiefly or wholly liquid.

As the disease tends of itself to run a favourable course and to terminate in from three to five days, and as even apparently severe cases often terminate naturally within the shorter of these periods, it is somewhat difficult to estimate the effect of drugs upon its course. I am in the habit of prescribing tincture of perchloride of iron for this disease, in doses of ten to twenty drops every four hours, and have every reason to be satisfied with the treatment. Occasionally I combine quinine with the iron. I have used salol, sometimes, in ten-grain doses every four hours with apparent benefit. Salicylate of sodium, chlorate of potash, benzoate of sodium, and guaiacum are among the drugs which have advocates.

I do not, as a rule, prescribe local treatment, but a solution of borac acid and borax (formula 6), or of chlorate of potash, used frequently as a gargle, is useful. The solution may not

reach the tonsils unless the patient is expert at gargling, and sometimes gargling is painful; but even as a mouth-wash it will be agreeable and cleansing. Sucking ice will sometimes be found to give relief, especially at an early stage. In cases where there is very great pain in swallowing, a ten per cent. solution of cocaine may be painted on the tonsils, and food administered during the ensuing anæsthesia.

2. PHLEGMONOUS TONSILLITIS AND PERITONSILLITIS (Quinsy).

Inflammation, attended with the formation of a more or less considerable collection of pus in the tonsil, or in the cellular tissue immediately external to the tonsil, is a common affection. The term "quinsy," which has been applied to different inflammatory affections of the throat, is now mostly restricted to this disease. Peritonsillar abscess is much the commoner form, and, as might be expected, it is also the more severe.

Causation.—The disease is rare in young children. It is most frequent in young adults, and is apt to recur repeatedly in certain predisposed individuals. An unhealthy condition of the tonsils is undoubtedly a predisposing cause of phlegmonous tonsillitis. Cold is often assigned as the immediate cause of an attack. Occasionally it follows closely upon an attack of catarrhal or lacunar tonsillitis.

Symptoms.—The disease often develops rather gradually, but may have a sudden sharp onset, with chills and marked rise of temperature. As a rule, however, the temperature in this complaint runs lower than in acute follicular tonsillitis, often keeping to about 99° or 100°. Pain is experienced from the first, usually confined to one side of the throat. The pain increases from day to day, as the disease advances, and generally becomes very severe, so that the act of swallowing is almost unbearable, and food is altogether refused. There is much difficulty in opening the mouth, a characteristic sign of this form of tonsillitis. At the height of the disease it is often

impossible to separate the teeth sufficiently to obtain a view of the throat. Mere movement of the head may give pain, owing to the infiltration of the tissues of the neck outside the tonsil. All these local symptoms are more pronounced in the peritonsillar form of the disease.

The tongue is thickly furred and the breath foul, and there is an increased flow of saliva, which in some cases trickles constantly from the mouth. Thick viscid secretion hangs about the throat, which the patient endeavours to clear by hawking efforts. Nasal respiration is impeded, and speech is thick and indistinct. Deafness, tinnitus, and earache may be present. Owing to the swelling in the pharynx, breathing may be somewhat impeded. On dropping off to sleep the patient will often start up with a feeling of impending suffocation. Very rarely hoarseness and laryngeal dyspnoea set in from extension of the oedematous condition to the parts about the laryngeal orifice.

On inspection, at the beginning of the disease, some general inflammation of the mucous membrane of the throat will be present. Very early in the attack one side will be found to exhibit more marked swelling and a deeper redness than the other; for although suppuration sometimes occurs on both sides, yet in such cases the disease is very rarely simultaneous on the two sides, but as one side subsides the other begins to be affected.

The tonsil on the affected side may be considerably swollen, or it may be simply pushed inwards, projecting as far as or beyond the middle line. In most cases (peritonsillitis) a marked swelling takes place in the region of the anterior pillar of the fauces, which, together with the adjacent part of the soft palate, is of a deep red colour, projects forward and inward, and may even partly conceal the tonsil on that side. In other cases, the main swelling may occupy the region of the posterior pillar, forcing the tonsil and anterior pillar forward.

In association with the unilateral swelling there is often

marked redness of the soft palate and uvula. The uvula may become œdematous, and greatly swollen. Both tonsils are of a deep dusky red colour, and greyish pultaceous plugs are often present in the lacunar depressions. On the outside of the neck some swelling and tenderness of the submaxillary lymphatic glands, and sometimes an infiltration of the surrounding parts, may be felt. The parotid region, behind the ramus of the lower jaw, is tender and resistant to pressure.

On palpation the prominent point of the swelling in the throat will feel more or less elastic or fluctuating. The fluctuating point is rarely situated in the tonsil itself. The position at which it is generally to be sought is about a quarter of an inch external to the free (internal) border of the anterior pillar, at the junction of the upper third and inferior two-thirds of the pillar. The fluctuating point may, however, be situated behind the tonsil, in the region of the posterior pillar. It is rarely on the tonsil itself. Sometimes, with one finger in the throat, on the tonsil or anterior pillar, and one outside, behind the angle of the jaw, fluctuation may be made out.

The attack lasts from five to fourteen days, or even longer, and terminates with the occurrence, spontaneous or artificially produced, of a discharge of very fetid pus. It occasionally happens, however, that all the signs and symptoms of phlegmonous tonsillitis are present, and that the disease nevertheless terminates gradually in resolution, without the formation of pus. Spontaneous escape of pus may take place through the surface of the tonsil, or through one or more of the cryptic orifices. More frequently it takes place between the anterior pillar and the tonsil, or through the usual site of the greatest prominence on the anterior pillar. If the evacuation takes place in the night, the patient may be unaware of its occurrence, except from the relief experienced on waking. After evacuation of the pus all the symptoms rapidly disappear, and convalescence is at once established, unless interrupted by the recurrence of the disease on the opposite side.

The disease ends, almost uniformly, in recovery. Un-
toward results have been recorded in exceptional cases from the
extension of the inflammatory process to the neighbouring parts.
Extension downwards may lead to oedema about the glottis.
Suppuration may in rare cases extend to the submaxillary
region, and ulceration of one of the great arteries in this
region, or infectious phlebitis of one of the large veins has
been known to occur. Fatal results have also been recorded,
especially in children, from the entry of a quantity of
pus into the air-passages when the abscess has burst during
sleep.

Occasionally, owing to the unfavourable situation of the
opening, or to its sinuous course, or for some other reason, an
abscess in or around the tonsil has been observed to take on a
chronic course, pus being discharged at longer or shorter
intervals for an indefinite period. An abscess has also been
known to remain encysted in the tonsil, without evacuation, for
a long period.

Treatment.—In the earlier stages of phlegmonous in-
flammation, ice, internally and externally, not only mitigates
the painful symptoms, but perhaps may cause the disease
to abort. Pieces of ice may be sucked and the throat gargled
frequently with iced water, and an ice-bag, or a Leiter's coil,
applied to the neck. In some cases cold is disagreeable to
the patient, and then, as well as in the later stages in all
cases, warmth should be used. Gargling with hot water will
tend to bring the abscess to the surface, and hot poultices or
fomentations externally will relieve pain. Steam inhalations
are also useful, especially when, owing to the severity of the
local symptoms, gargling is difficult or painful.

I am very doubtful whether any internal remedies influence
the course of the disease. Some authorities believe that
guaiaicum has the effect of cutting short the disease or causing
it to abort. Salol (gr. x-xv) has also been strongly recom-
mended for the same object. The feverish condition may be

combated with suitable remedies, and opiates may be required to soothe the pain during the course of the case.

In none of the inflammatory throat affections, probably, is the application of cocaine to the throat more useful. De Havilland Hall has indeed brought forward some evidence to show that painting the parts with cocaine may cause the disease to abort. In any case, it affords marked temporary relief, and enables a patient, who may not have taken any food for twenty-four hours, or even more, owing to the intense pain caused by swallowing, to take a meal of bread and milk or other soft food with comparative ease. A twenty per cent. solution of cocaine should be used to obtain the best effect.

As soon as the presence of a collection of pus is diagnosed, an incision should be made. It is often difficult to decide on the best point to make the incision, in order to reach the abscess. In many cases the soft palate in the neighbourhood of the anterior faucial pillar bulges markedly forward, and then the incision should be made at the most prominent part of this swelling. In some cases the tonsil itself will have to be incised; in others a fluctuating prominence will be felt in the region of the posterior pillar, and will have to be selected as the point of incision. Not unfrequently a second incision will have to be made, if pus is not reached the first time. If the incision does not give exit to pus, and the abscess is believed to lie deeper, a fine pair of sinus forceps may be passed in and slightly opened. This will generally succeed in allowing the pus to escape. Even if pus is not reached by one or more incisions, the tension and pain are considerably abated, and pus may eventually be evacuated at the site of the incision.

After the escape of pus the pain and other troubles rapidly subside. Hot gargles may be used to promote the escape of pus. It may in some cases be desirable to pass in a director through the opening, on one or two subsequent days, to prevent too early closure. A too early closure of the opening may result in a relapse with formation of a fresh collection of pus.

IV. MEMBRANOUS SORE THROATS.

DIPHTHERIA has long been known as the type of a membranous inflammation of the throat, and with the exception of the false membranes which are known to be associated with herpes of the pharynx, and of those occasionally caused by certain chemical caustics, the existence of non-diphtherial membranous inflammation of the throat was, until recent years, hardly recognized.

It is now recognized that false membranes may be produced in the throat by streptococci, staphylococci, pneumococci, and some other micro-organisms. The streptococcus appears to be by far the most frequent agent in their production. It is not at present possible to differentiate, by their clinical aspect, cases arising from one or other of these various micro-organisms, nor is there sufficient known about these non-diphtherial membranous inflammations, which simulate diphtheria more or less closely, to give any accurate description of them.

Non-diphtherial membranous inflammation of the throat may occur as a primary affection, or it may be secondary to one of the infectious diseases, especially to scarlet fever. It may also be secondary to some lesion of the throat, operative or otherwise, *e.g.* to excision on the tonsils. As in diphtheria, the seat of election is the tonsils, and in the majority of cases, the membranes remain confined to the tonsils. The disease may assume the ordinary aspect of follicular tonsillitis, the membranous patches being confined to the neighbourhood of the cryptic orifices, or the tonsils may be covered with a continuous membrane. Less frequently, patches of membrane

appear on the pillars of the fauces, the soft palate and uvula, or all these parts may be covered with a uniform membrane. Membrane may also appear on the posterior pharyngeal wall.

Occurring as a primary complaint, these sore throats are generally attended with a sharp onset, and a marked rise of temperature, and there is usually considerable soreness of the throat. The glands beneath the angle of the jaw are enlarged, and albuminuria is common. Most cases run a course of five to eight days. Occasionally membranous deposits in the throat have been observed in cases running a somewhat prolonged course, perhaps of several weeks, unattended with any marked symptoms. In certain virulent streptococcic infections, the symptoms may be very severe. The temperature runs high, the inflammatory reaction of the mucous membrane is intense, the glandular enlargement in the neck is very great, and the cellular tissue around is much infiltrated. The breath assumes an offensive odour, the face is pale and the patient becomes rapidly prostrated. In one respect all these cases contrast with diphtheria, and that is in the generally favourable issue of the case. Even in the more severe forms, recovery is the rule, and in the milder forms almost invariable. It is otherwise, however, in the septic forms, complicating scarlet fever. Here a rapidly fatal issue is common.

In general, the membranes are softer and more friable than ordinary diphtheria membranes, and in the majority of cases they are confined to the tonsils. Still, in exceptional cases, the appearances are those of typical diphtheria; and, again, it is well known that diphtheria occurs in atypical forms. For these reasons a bacteriological examination is the only reliable test. Nevertheless, it may be safely said that nearly all cases presenting the typical appearances of primary diphtheria will be found to be due to the Klebs-Löffler bacillus.

The treatment of membranous inflammation of the tonsils and pharynx does not differ materially from that of non-

membranous inflammations. Antiseptic gargles, mouth-washes, and sprays are important in the more septic forms, and direct applications of an antiseptic nature, similar to those recommended in the treatment of diphtheria, are indicated in severe forms.

V. HYPERTROPHY OF THE TONSILS.

Causation and Nature.—Hypertrophy of the tonsils is especially a complaint of childhood, and when met with in adults it almost invariably dates back from an earlier period of life. In some cases the enlargement is present at birth. It mostly commences during the earlier years of childhood, between two and six years of age. After puberty hypertrophied tonsils tend to diminish in size, and this tendency is more marked still after twenty years of age.

The cause of the enlargement, in the majority of cases, must be looked for in a special predisposition in certain children towards hypertrophy, not only of the faucial tonsils, but of the adenoid structures, generally, of the pharynx and naso-pharynx. This predisposition, which, in some instances, may be regarded as a manifestation of the so-called strumous diathesis, will often be found to be inherited from parents, and it quite commonly shows itself in several children of the same family.

All inflammatory affections of the throat, whether simple or symptomatic of infectious maladies, tend to produce chronic enlargement of the tonsils in children.

In hypertrophy of the tonsils all the tissues are more or less involved. The lymph follicles are increased in size and in number, the diffuse adenoid tissue is increased, and the connective tissue is more or less hypertrophied. In certain cases the hypertrophy affects principally the diffuse adenoid tissue and follicles, in others the connective tissue, and the

consistence of the enlarged tonsil is in proportion to the amount of connective tissue hypertrophy. The lacunæ are increased in depth with the general enlargement, and the orifices are often enlarged and gaping. Sometimes, from inflammatory processes which occur on the surface, the orifices of some of the lacunæ are narrowed, or even completely closed, and from similar causes small bands often pass across the surface, bridging over the lacunar orifices and forming channels, which are not present in the normal tonsil.

The contents of the lacunæ consist usually of a turbid fluid, which can be caused to exude by pressure on the tonsil. Sometimes they contain a soft, whitish-yellow, cheesy material. On microscopical examination the fluid will be found to contain numerous epithelial cells from the lining membrane of the lacunæ, and many lymph corpuscles. The cheesy material is likewise principally composed of layers of desquamated scaly epithelium. It also contains lymph corpuscles and numerous micro-organisms of various kinds (diplococci, streptococci, leptothrix, etc.). Sometimes the cheesy contents in course of time become calcareous, and form a calculus of varying shape and size.

The form and consistence, as well as the aspect of enlarged tonsils, vary much. Two types, however, may be recognized, to one or other of which a large number of cases can without difficulty be assigned (*Buault*). These are the soft or lymphoid hypertrophy, and the firm or fibrous hypertrophy. The former variety is especially observed in young children or infants, as a part of a general hypertrophy of the adenoid structures of the pharynx and naso-pharynx. The tonsils are generally pale and semi-transparent in appearance, soft, flattened, and not projecting much or at all beyond the pillars. The symptoms are chiefly those of the concomitant adenoid vegetations in the naso-pharynx. These tonsils in the course of time may pass into the second, or fibrous variety. The firm or fibrous form of hypertrophy of the tonsil is observed more

especially in older children, about the age of puberty, or in adults. It is connected with repeated inflammatory attacks of the tonsils, rather than with a general enlargement of the adenoid structures of the pharynx. The tonsils are of a bright or dusky red colour, of a firm consistence, and a rounded, oval, or lobulated form, projecting beyond the pillars, often somewhat pedunculated. Tonsils of the soft or adenoid type may, in consequence of inflammatory attacks, pass into the firm or fibrous variety, but, unless induration has become marked, they tend to diminish after puberty, and to disappear. On the other hand, the hard, fibrous tonsil shows much less tendency to diminish after puberty, and may even continue far into adult life without marked diminution.

Symptoms.—Moderate enlargement of the tonsils may be attended with no symptoms and no inconvenience. When the enlargement is very considerable, symptoms will arise; but it may be safely affirmed that the serious troubles which were formerly attributed to enlarged tonsils were, in the majority of cases, dependent upon coincident hypertrophy of the pharyngeal tonsil (adenoid vegetations).

Very marked enlargement of the tonsils will, however, lead to interference with respiration, voice, and hearing. The breathing is carried on through the mouth, which is kept constantly open. The mouth-breathing habit carries with it the well-known facial expression. The breathing carried on through the mouth is apt to be noisy, the noisy breathing being especially noticeable in eating or drinking. In sleep the patient lies with the mouth open and snores, and sleep is usually very disturbed. In fact, the symptoms of impeded respiration are similar to those of adenoid vegetations; but it will rarely be found that this group of symptoms is due to the enlargement of tonsils alone. Hypertrophy of the pharyngeal tonsil (adenoid vegetations) will almost invariably be found to coincide with marked symptoms of impeded nasal respiration.

The speech, in cases of very large tonsils, is thick, wanting in resonance and indistinct. Children so affected are slow in learning to articulate clearly. The interference with speech is chiefly due to the impediment to the free action of the soft palate and its muscles. In adults moderate enlargement of the tonsils, while not interfering with the ordinary voice, may produce a liability to fatigue of the voice, especially in persons engaged in public speaking or singing.

Disturbances of hearing are rare unless there is coincident enlargement of the pharyngeal tonsil. In so far as they depend on enlargement of the tonsils, they result, not from pressure upon the Eustachian tube, as has sometimes been stated, but from the impediment to the free movement of the palate muscles which act upon the Eustachian cartilage.

There is no pain in swallowing, unless some sub-acute inflammatory condition be present; but uncomfortable sensations may be complained of similar to those described in connection with chronic pharyngitis. More or less increased secretion of mucus is often present, and a tendency to hawk and clear the throat. A troublesome, hacking, or barking cough may also result from enlarged tonsils. The cough is sometimes almost continual, except at meals or during sleep. In some cases it comes on in paroxysms at certain regular intervals. Not unfrequently, especially in children, it comes on regularly soon after going to bed at night.

The hypertrophied condition of the tonsils predisposes to recurrent inflammatory attacks, whether of the nature of simple catarrh, of lacunar tonsillitis, or of phlegmonous tonsillitis, or peritonsillitis. It is often for this reason that active treatment is called for.

On inspection of the pharynx, more or less enlargement of one or both tonsils will be seen. The tonsils may be enlarged uniformly in all their parts, projecting into the pharynx to a greater or less degree, according to their size, and at the same time pushing the anterior and posterior pillars away from each

other. In some cases they project into the pharynx, leaving the pillars free and not unduly separated, the attached portion being sometimes narrowed, approaching in appearance to a pedicle. In other cases the enlarged tonsils are to a great extent lodged within the pillars, which are widely distended, especially the anterior, to which the tonsil is more or less adherent. The tonsil may be enlarged chiefly in the antero-posterior direction, and so present a flattened appearance, not projecting beyond the pillars. The enlargement may extend upwards into the naso-pharynx, and downwards to the base of the tongue. Both tonsils may be enlarged equally, or there may be a marked difference between the two sides.

The colour of the enlarged tonsil may not differ from the normal, or it may be abnormally red, or abnormally pale. The surface may be uniform and smooth, or it may be very irregular. Numerous bands often pass across the surface, and deep clefts in the surface may divide the tonsil into lobes. Cheesy plugs are not unfrequently visible at the orifices of the lacunæ. The consistence of enlarged tonsils is very variable. Sometimes they feel elastic and firm, sometimes extremely soft, almost friable.

Some enlargement of the lymphatic glands below the angle of the jaw is often associated with chronic hypertrophy of the tonsils.

Treatment.—Cod-liver oil, and iron, and tonics are frequently indicated for the general condition of the subjects of enlarged tonsils, but these or other internal remedies cannot be said to have any direct effect on the enlargement of the tonsils. Moderate enlargement of the tonsils, giving rise to no symptoms or inconvenience, need not be interfered with. When, however, the enlargement is great, or when with moderate-sized tonsils there are resulting troubles, such as a liability to inflammatory attacks, active local treatment will be called for.

Local applications have been largely used with a view to

reducing the size of the tonsils. Tincture of perchloride of iron (3i or 3ii to ʒi), glycerine of tannin, and finely powdered alum or tannin have, among other remedies, been largely applied. The iodo-glycerine solution (formula 13) is, perhaps, the most effectual application, though none of these remedies, in my experience, produces any very decided effect in the reduction of hypertrophied tonsils. Some surgical procedure is necessary for this purpose.

The quickest and most effectual treatment is removal of the tonsil with a bistoury or guillotine. The bistoury is rarely employed now, but is preferred by some operators who otherwise habitually use the guillotine, in those cases where the tonsils are enlarged in the antero-posterior direction, and are lodged deeply between the pillars, making no projection into the pharynx. In such cases the tonsil is recommended to be drawn forcibly towards the middle line with a vulsellum, and the portion projecting beyond the pillars removed with a probe-pointed bistoury.

In the vast majority of cases the tonsil can be removed

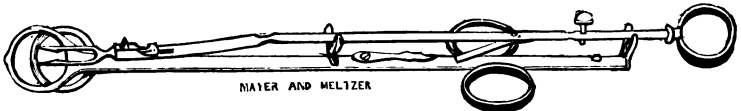


FIG. 59.—Matthieu's Guillotine.

with the guillotine. An anæsthetic is not usually necessary, unless in the case of very nervous, unmanageable children. The parts, however, may be painted, before operating, with a solution of cocaine. There are two kinds of guillotine in very general use. One which is very largely used is that known as Fahnstock's or Matthieu's (Fig. 59). In using the instrument the ring is made to encircle the tonsil, the fork is then pushed down, transfixing the tonsil and drawing it out, at the same time that the cutting ring cuts it through. The other kind is Physick's guillotine, as modified by Morell Mackenzie,

and generally known as Mackenzie's guillotine (Fig. 60). Three sizes ought to be at hand. This instrument is less complicated than the preceding, and is the one most generally used in this country. I think the principal advantage of Fahnstock's guillotine is that the ring which encircles the tonsil has the larger diameter vertical, which corresponds to the shape of the majority of enlarged tonsils. I have, however, always used Mackenzie's guillotine.

In operating the patient is placed facing the light, the operator having his back to it, or the throat may be illuminated with the frontal mirror as for laryngoscopy. Small children

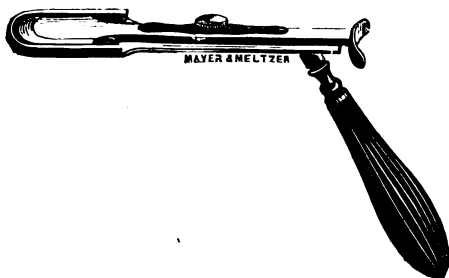


FIG. 60.—Mackenzie's Guillotine.

must of course be held securely in the lap of a nurse or assistant. The guillotine is held in the right hand and the aperture is placed over the tonsil. Care must be taken to introduce the guillotine far enough back so as to completely encircle the tonsil, and it is better to pass the ring over the lower end of the tonsil first, as the tonsil not unfrequently projects down below its attachments in the form of a free lobe or tail, which is apt to be missed by the guillotine. The instrument is then firmly pressed towards the side of the pharynx. At the same time some pressure can, if necessary, be made with the thumb or index finger of the left hand placed under the angle of the jaw so as to press the tonsil inwards,

while with the thumb of the right hand the blade is driven sharply home.

The bleeding after tonsillotomy soon ceases, especially in children. Of course if one were aware of the existence of a hæmorrhagic diathesis, tonsillotomy would be avoided, as in such a subject dangerous and even fatal hæmorrhage may occur. Apart from this, however, troublesome and dangerous hæmorrhage has occasionally followed the operation, although it is extremely rare. This accident has mostly occurred with adults, and in cases of firm fibrous tonsils, this condition having a tendency to prevent retraction of the cut vessels. Ice to suck and styptic remedies applied directly or used as a gargle will almost invariably arrest the hæmorrhage. In all cases when the bleeding is serious, an attempt should be made to find the bleeding vessel, and to twist or tie it, or, failing this, ligation of the base of the tonsil should be attempted. Both the external and common carotids have been tied by various operators in these cases, when other means have failed. In view of the possibility of dangerous hæmorrhage, some operators prefer to remove the tonsils with the galvano-caustic snare.

A point which is too often overlooked in connection with excision of the tonsil is the advisability of separating the adhesions which often exist between the hypertrophied tonsil and the pillars of the fauces. This can generally be done with a blunt hook or the finger; but in children it can only be satisfactorily done when an anæsthetic is given for excision of the tonsils. The preliminary freeing of the faucial pillars has several advantages. It enables the tonsils to be more cleanly removed. It avoids one source of troublesome hæmorrhage, as the adherent pillars are apt to be cut by the guillotine, and are liable to bleed more than the tonsil itself. The pain after tonsillotomy is also more marked when the pillars are cut. Even if the pillars are not wounded there remains the stump of the tonsil, and the adhesion of the pillars to this impairs the

action of the palate muscles, and may thus interfere with the proper restoration of the voice.

Although ablation is the most speedy and certain treatment, other methods have occasionally to be adopted. Sometimes the operation of excision is objected to by the patient. Again, certain flat tonsils do not offer themselves very conveniently for excision. In such cases the galvano-cautery may be employed to reduce the size of the tonsils. The best plan is to introduce the point of the electrode deeply into the crypts and then turn on the current and cut out through the intervening tissue. Where the point cannot be introduced into a cryptic cavity, it may be plunged into the tonsil when at a red heat and drawn outwards through the tissue as before. It is well to treat only one tonsil at a sitting, and not to cauterize this too extensively. Care must be taken to avoid burning the faucial pillars. Cocaine should of course be applied before using the cautery. Three or four sittings, at intervals of eight or ten days, will thus be usually needed to complete the case. This method is rarely applicable in children, in whom, moreover, excision is for every reason the best treatment.

Another method of reducing hypertrophied tonsils is that of Hoffmann, which consists in breaking up the tonsil with a blunt hook. The hook should be passed beneath any obvious bands or bridges of tissue on the tonsils, and these should be torn forcibly through. In a similar way the walls of the crypts are divided by insinuating the hook into the cavity, and bringing the point out through a neighbouring orifice, or pushing it through the tonsil tissue. It will be advisable sometimes to supplement the use of the hook with the scissors, to remove any large tags that are left. In attempting this method of reducing hypertrophied tonsils, considerable difficulty will sometimes be found in tearing through the tonsil tissue with the hook. For this reason it is better to use some cutting instrument such as the hook-shaped knife, shown in

Fig. 61. This method is not very effective for reducing the size of very large tonsils, and is chiefly suitable for flat tonsils, and for those with dilated crypts containing cheesy material. The hook-shaped knife is very useful also for dividing adhesions between the tonsils and anterior pillars.

VI. CHRONIC LACUNAR TONSILLITIS.

UNDER this designation may conveniently be included certain chronic troubles, which are associated with the accumulation of cheesy masses in the cavity of the tonsillar crypts. The tonsils so affected are usually more or less hypertrophied, but not necessarily so. The complaint is commonly met with in young adults, the majority being between twenty and thirty years of age. The essential element in the causation appears to be a narrowing or occlusion of the orifices of the crypts, probably dependent upon former attacks of catarrhal inflammation. Another important factor in the causation, no doubt, is an abnormally free disquamation of the epithelial cells. In consequence of the narrowing or occlusion of the orifice, the contents of the crypt accumulate in the form of a cheesy-looking, ill-smelling mass, varying in size from a hemp seed to a small bean, consisting principally of layers of desquamated epithelium more or less altered in character, the cells in the outer layers next the walls of the cavity being least altered. A certain proportion of leucocytes is also present. Towards the centre, the mass is composed of fatty matter, cholesterine, and sometimes gritty, calcareous material. Leptothrix filaments and numerous micro-organisms are also present in the masses. Cheesy concretions exuding from the tonsil crypts are frequently retained in the supra-tonsillar fossa and in the pockets leading from this fossa, especially in that between the tonsil and anterior pillar. This results from the contraction of the orifice of the fossa and the disposition of the plica triangularis (see p. 27). Cheesy masses retained in the crypts, and supra-

tonsillar fossa are a source of irritation, and predispose to inflammatory processes in the tonsils, of an acute, subacute, or chronic nature.

The symptoms of the complaint are very variable in severity and character. Some pain or discomfort in the throat is generally complained of; often at one side only. Some pain in swallowing is often present, but, as a rule, this is not felt when swallowing food, but only when swallowing saliva. Occasionally neuralgic pains radiating to the face and ears are complained of. A feeling of tickling or pricking in the throat or of a foreign body is often described. Sometimes troublesome coughing fits are present, especially in the morning. The breath is often slightly offensive, and the patient may complain of a disagreeable taste or smell which is felt to proceed from the throat.

Patients affected with this complaint expel from the tonsils, from time to time, these yellowish-white cheesy plugs, their expulsion being favoured by the muscular contractions in deglutition. The masses vary in size from a millet seed to a pea, or they may be still larger. They usually have a disagreeable odour. They are often expectorated, and attract the notice of the patient, who may, or may not, feel disquieted at their appearance. Often enough, feeling some discomfort in the throat, he looks in the glass and perceives similar plugs in the tonsils, and thus becomes aware of their source. He may seek medical advice merely on account of their presence, or in consequence of some discomfort resulting from them.

On examining the throat the tonsils are usually found enlarged. The enlargement, however, is generally not very marked. In many cases, owing to adhesions between the tonsil and anterior pillar, the tonsil is to a great extent concealed from view. One or more yellowish-white spots may be seen, consisting of cheesy plugs occupying the lacunar orifices. Sometimes a careful search may fail to discover any concretion in the lacunar orifices. In this case pressure with the tongue-

depressor, or the introduction of a probe into a lacuna, may bring to view one of these cheesy masses not previously visible. It is, however, especially necessary to search in the supra-tonsillar fossa for retained masses. The anterior pillar or plica triangularis must be drawn aside, or a probe or spud passed into the fossa. Sometimes the rhinoscopic mirror may be useful to detect the concretions in the upper and posterior region of the tonsil.

The cheesy masses will be found to be non-adherent and easily removable, in distinction from the not dissimilar whitish masses which characterize the affection known as pharyngomycosis (see p. 381). Pale yellow spots are sometimes seen on the surface of the tonsil, consisting of cheesy masses showing through a thin covering of mucous membrane, as may be shown by incising the surface or breaking through it with the point of the probe, and evacuating the contents. These are masses retained in a crypt through closure of the natural orifice.

The troubles associated with this complaint are more or less intermittent. Some patients are subject to definite subacute attacks lasting a few days, during which the pain and other local troubles are intensified, and some general malaise, with perhaps a little fever, may be present. If the throat be examined during one of these exacerbations, the lacunar orifices are more than usually blocked with cheesy masses; the tonsils may be slightly swollen, and there is slight redness in the vicinity of the lacunar orifices. The cheesy plugs are removed with more difficulty than usual, being apparently more adherent to the surface. After removal a fresh plug will be found presenting at the orifice the following day. After a second or third removal they reappear more slowly. In some cases the thin covering over the imprisoned cheesy masses above described is noticed to undergo ulceration and give exit to the contents, leaving a circular or oval depression, the ulcerated edges of which heal in the course of a few days.

Treatment.—The mere appearance of a caseous plug in a

tonsil does not, of course, call for any special treatment. It is of not unfrequent occurrence, giving rise to no inconvenience, and only accidentally discovered. When, however, the formation of these masses in the crypts is a chronic process, and is associated with various discomforts, such as those above mentioned, the complaint calls for treatment, and moreover the results of proper treatment are extremely satisfactory. In every case in which the symptoms described above are present, and no other obvious cause is found, this condition should be thought of and the tonsils carefully explored, and an inquiry made for a history of the expectoration of the cheesy masses. Many of these cases are unrecognized, and the condition of the tonsils is overlooked, owing to a careful search not being made.

If the tonsils are large, and such as lend themselves to excision, that operation may be the most rapid means of cure, though it sometimes happens that the process continues in the portions of the lacunæ which remain in the stump of the tonsil. In the majority of cases, however, the tonsils do not call for excision. The most rational and effective treatment is to open up the crypts by free division of the crypt walls. This may be done with a blunt hook, but it is easier and better to use a hook-shaped knife, such as that shown in Fig. 61.*



FIG. 61.—Curved Knife for slitting up Tonsils.

Several crypts may be opened up at a sitting, and any cheesy masses that may be present are evacuated. Adhesions between the tonsil and anterior pillar must be divided and the aperture to the supratonsillar fossa made free by division of the plica triangularis or otherwise. A strong solution of iodine

* Made by Meyer and Meltzer, of Great Portland Street.

(formula 14) should be applied to the cut surfaces and the interior of the cavities containing cheesy concretions. The application diminishes the tendency of the cut surfaces to unite, and in any case it is a good antiseptic application, and should never be omitted.

VII. CALCULUS OF THE TONSIL.

CALCAREOUS concretions sometimes form in the tonsillar crypts, or in the supratonsillar fossa, apparently through calcification of the cheesy masses described in the last section. Minute concretions and sandy particles are common enough, but a calculus, varying in size from a pea to a cherry, is sometimes met with. The shape of the calculus varies much, and it has been found branched, like coral. More than one calculus has been met with in a tonsil. As a rule, one tonsil only is affected. The composition is almost wholly carbonate and phosphate of lime. *Leptothrix* filaments can be traced in the substance of these calculi as in the cheesy concretions.

There are no characteristic symptoms. The patients are apt to suffer from repeated inflammatory attacks, and this condition may extend over many years. It is often during such an attack that the presence of a stone is first discovered. Sometimes a constant pricking in the throat is complained of, sometimes a dry hacking cough is present. The diagnosis is made when the whitish concretion is seen projecting at a cryptic orifice, and its consistency tested with a probe. Occasionally, although not visible, a stone has been detected with an exploring needle or by palpation of the tonsil with the finger. Sometimes small calculi are discharged spontaneously from the tonsil.

The treatment consists in removing the calculus, which can usually be done with a forceps. If necessary, the wall of the crypt may be incised to facilitate removal.

VIII. DISEASES OF THE LINGUAL TONSIL.

THE lingual tonsil, as already mentioned (p. 28), consists of a collection of lymphoid tissue situated at the base of the tongue, in the region lying between the circumvallate papillæ and the epiglottis, and bounded at each side by the faucial tonsils. The lingual tonsil is subject to diseased conditions, analogous to those which affect the faucial tonsils, but these affections are much less common here than in the faucial tonsils.

Acute or subacute catarrhal tonsillitis in this region may occur as a primary affection, or it may develop in connection with an acute pharyngitis, or faucial tonsillitis. The complaint is attended with some general malaise and fever in proportion to the severity of the inflammation. There is more or less pain, sometimes severe pain, in swallowing, a burning or pricking feeling in the throat, or a sensation of a foreign body. On a simple inspection of the pharynx there may be a little redness of the anterior pillars, and nothing more to account for the pain complained of. For this reason the true nature of the complaint often remains unrecognized. With the aid of the laryngeal mirror, however, its true nature will become apparent. The surface of the lingual tonsil is seen to be red and swollen, and the swelling of the tonsil tissue may, in some cases, be such as to bring it in contact with the epiglottis. The attack runs its course, usually, in a few days. An acute lacunar or follicular tonsillitis may also occur, the symptoms resembling those just described, except that they are apt, on the whole, to be more severe

and of rather longer duration. On examination some of the cryptic orifices will be found covered with whitish points of exudation, which, in some cases, become confluent so as to cover a greater or less extent of surface.

The treatment of these cases is similar to that of faucial tonsillitis. Applications of cocaine will be found useful to relieve pain and difficulty of swallowing.

Acute phlegmonous inflammation of the lingual tonsil has been observed as a primary affection. It has also been observed as a result of mechanical injury (foreign bodies, caustics, etc.), and in association with a phlegmonous inflammation of the faucial tonsil. The inflammation involves one or both sides, and usually terminates in the formation of abscess. In addition to general febrile symptoms, the patient complains of pain in the throat, in the region of the hyoid bone, usually at one side only. Deglutition is extremely difficult and painful, and pains are often experienced shooting up to the ear. There is no difficulty in opening the mouth. In some cases the tongue can be protruded easily, in most cases only with difficulty. Salivation has been noted in some instances. Laryngeal dyspnoea not unfrequently complicates the symptoms.

On inspection (with the mirror) the lingual tonsil, on one side, or in its whole extent, is seen to be inflamed and raised up from its base by a more or less diffused swelling. The epiglottis is somewhat inflamed and œdematous on its anterior aspect, and it may be pushed back to some extent, by the swollen tonsil, over the laryngeal orifice. On palpation of the posterior portion of the tongue, a tense swelling, very tender on pressure, can be made out, and sometimes fluctuation can be detected. If left to itself the abscess opens spontaneously from the eighth to the fourteenth day, after which all the symptoms quickly disappear. In some cases the inflammation terminates in resolution without the formation of abscess. Occasionally after evacuation of the abscess somewhat sharp hæmorrhage has occurred.

The treatment must be similar to that of phlegmonous inflammation of the faucial tonsils. As soon as fluctuation can be made out an incision should be made and the pus evacuated. Cocaine will be useful to relieve the pain and dysphagia.

Hypertrophy of the Lingual Tonsil.—The commonest affection of the lingual tonsil with which we have to deal is hypertrophy. Unlike hypertrophy of the faucial and pharyngeal tonsils, this affection is hardly observed, except in adults. It is most commonly met with between twenty-five and forty years of age. According to most observers, the disease is much more frequent in women, and this is my own experience. Seifert, however, in a hundred and six cases found fifty-eight men and forty-eight women. Nothing very definite is known as to the etiology of the disease, but it is often found associated with chronic and granular pharyngitis, and it seems probable that most acute and chronic inflammatory affections of the pharynx may take part in its causation.

Symptoms.—A constant feeling of a foreign body in the throat, variously described as a lump, a skin, a hair, etc., by the patient, is the most common symptom complained of. This feeling gives rise to considerable discomfort in some subjects, and leads to a continual desire to clear the throat by swallowing, or frequent sharp coughs or "hems." Sometimes troublesome fits of coughing occur. A tickling or burning feeling in the throat is sometimes complained of, and occasionally actual pain. The sensation may or may not be correctly localized by the patient to the region of the base of the tongue or hyoid bone. Sometimes the sensation is referred to the centre of the throat, sometimes to one side, not unfrequently to the region of the trachea.

The symptoms vary much in intensity at different times. They are often most marked towards evening, and may be completely absent in the earlier part of the day. There is rarely any trouble in swallowing; on the contrary, the discomforts usually disappear during meals. On the other hand,

they are apt to be increased by the use of the voice, and there is often a great disposition to fatigue of the voice, produced by speaking, but especially by singing and public speaking. The symptoms of the complaint are by no means proportioned to the degree of the local affection, and I have invariably found them more marked in neurotic subjects. A hypertrophied lingual tonsil is not unfrequently discovered accidentally, which has not given rise to any discomfort whatever.

On examination with the mirror, the space between the epiglottis and the base of the tongue is seen to be filled up with an uneven mass formed by the hypertrophied adenoid tissue, which constitutes the lingual tissue. In some cases there is a more or less uniform enlargement of this tissue, which forms a rounded, uneven mass, with a central furrow, in which the epiglottis may be lodged. In other cases the mass is more or less lobulated, and occasionally the hypertrophy affects only one half of the tonsil, or it may affect only an isolated portion, forming a raspberry-like tumour. The hypertrophied mass may be so large as to push back the epiglottis in an obvious manner, and it may touch or even overlap the free edge of the epiglottis.

It is by no means easy to decide whether the symptoms which have been already described really depend upon enlargement of the lingual tonsil, especially if the enlargement is of moderate degree. Many persons, especially those of a neurotic temperament, suffer from paræsthesiæ of the pharynx, exactly resembling the symptoms just described, without any enlargement of the lingual tonsil, or, indeed, any lesion whatever. Seifert has drawn attention to the advantages of the use of the probe and cocaine in the diagnosis. Thus, when the tonsil is touched at various points the patient may be able to say that the part where the discomfort is seated has been touched; or friction with the probe may elicit some of the symptoms. After painting the tonsil with cocaine the discomfort previously present may disappear. These are valuable

aids to the diagnosis, and should not be omitted ; but still, any one who has employed them will have found that the results are sometimes doubtful and indecisive.

Treatment.—Only cases in which there is reason to believe that the enlarged lingual tonsil is giving rise to troublesome symptoms should be subjected to treatment. Frequent application of glycerine of iodine, especially if applied with some friction, has been found useful in diminishing the size of the hypertrophied tonsil. Caustics, such as chromic acid and trichloroacetic acid, have also been recommended. The galvano-cautery affords, however, the best means of reducing the hypertrophied tissue. Generally, it will be sufficient to make several furrows in the mass with the heated blade, the process being repeated at two or three sittings, with eight or ten days' interval. Sometimes the cautery snare can be used with advantage for removing the whole or portions of the mass.

Varices.—Varicosity of the veins in the region of the lingual tonsil is occasionally observed. The veins may be uniformly dilated in the form of bluish and tortuous cords, or they may present saccular dilatations of varying size, projecting more or less above the surface. These varicosities are sometimes associated with various subjective sensations, such as a tickling sensation, or a feeling of a foreign body. Occasionally hæmorrhage has been observed to occur from varicose veins in this region. The galvano-cautery point is the best means of treating this condition should active interference appear to be indicated.

IX. ERYSIPELAS OF THE PHARYNX.

ERYSIPELAS of the throat may be primary or secondary. In the latter case it occurs by extension from the external parts, through the mouth or nose, and occasionally through the Eustachian tube. On the other hand, when the disease begins in the throat, it may spread thence to the skin through the same channels. Primary erysipelas is rare; but as the diagnosis, in the absence of external manifestation of the disease, has to depend on the clinical appearances, cases may occur in which, owing to an atypical or mild course, the true nature is not suspected.

Primary erysipelas of the pharynx may commence under the aspect of an ordinary acute pharyngitis, but as a rule the onset is marked by signs of severe constitutional disturbance and high fever. The febrile symptoms may precede the sore throat by a day or two, or both may commence simultaneously. The sore throat varies in intensity, but is often very marked and accompanied by much difficulty in swallowing. The glands at the angles of the jaw soon become swollen and tender, and movement of the jaws may be impeded and painful.

On inspection the mucous membrane of the throat is seen to be of a deep red colour, and presents a glossy appearance. It is usually much swollen, and marked œdema of the parts is often visible. Vesicles or bullæ are sometimes present, which burst and leave yellowish patches or ulcers. Abscesses rarely form in the pharynx in the course of erysipelas.

The disease may terminate favourably in six or seven days, but, on the other hand, it evinces a great tendency to wander to

the neighbouring parts, thus prolonging the course of the attack and evoking fresh symptoms. It may spread to the naso-pharynx, and the œdematous swelling may occlude this passage. Purulent otitis media may result from implication of the Eustachian tube. The most dangerous extension of the disease is that to the larynx, which may lead to rapid œdema and urgent symptoms of laryngeal dyspnœa.

The course of the fever is irregular, as in erysipelas generally. The temperature may rise to 105° F., or upwards, and sudden depressions are apt to occur. The pulse is frequent and weak; the general condition tends to adynamia, and delirium is not uncommon. Albumen is often present in the urine.

In the absence of erysipelas of the external parts the diagnosis is difficult, and must depend upon the rapid development and severity of the inflammatory symptoms and the tendency of the disease to wander, and on the severe constitutional disturbance.

The outlook is always grave. Recovery is, however, the rule. Death may take place from heart failure, or coma, from extension of the disease to the larynx, or from œdema or inflammation of the lungs.

Treatment.—Ice to suck and an ice collar to the neck should be tried with a view to diminishing the inflammatory symptoms. A stimulating diet should be maintained throughout. Tincture of perchloride of iron in twenty-drop doses every four hours should be administered internally. Quinine is also useful. De Havilland Hall recommends the application of a twenty per cent. solution of cocaine to the pharynx or larynx to diminish the inflammatory œdema. Free scarification of the swollen parts with a sharp bistoury is sometimes advisable, especially when respiration is impeded.

X. ACUTE INFECTIOUS PHLEGMON OF THE PHARYNX.

CASES of diffuse phlegmonous inflammation of the pharynx, with purulent infiltration of the peri-pharyngeal cellular tissue, rapidly invading the larynx and other structures, and terminating fatally, have been described, under the above name, by Senator,* Merklin,† and others. The disease commences with sore throat and fever, and for a few days may present no specially alarming symptoms. Presently, about the fourth or fifth day, the cervical glands enlarge and the neck becomes swollen and infiltrated. The dysphagia increases, hoarseness and dyspnoea supervene, and finally delirium and coma, ending in death from the fifth to the ninth day of the attack. On *post mortem* is found purulent infiltration of the posterior and lateral walls of the pharynx, of the tonsils and soft palate, of the posterior wall of the larynx, of the epiglottis and ary-epiglottic folds. In some cases the pus has burrowed down to the mediastinum.

.. The disease in its typical form is clinically distinct from erysipelas, in its onset, course, and termination. Nevertheless cases occur in which the line cannot be drawn between the two diseases, and many incline to the view that they are etiologically identical. Semon ‡ has recently advocated the view that not only these diseases, but some others, which have been described under the names acute œdema of the larynx, and

* *Berliner Klin. Woch.*, 1888, p. 77.

† *Bull. de la Soc. Méd. des Hôp.*, 1890, p. 845.

‡ *Medico-Chirurg. Transact.*, 1895.

angina Ludovici, are in all probability pathologically identical, and merely represent different degrees of severity of one and the same septic process. Bacteriological evidence is still wanting, but meantime this seems to be the most probable view.

In the cases of acute infectious phlegmon recorded up to the present, no treatment has been of avail to save the life of the patient.

XI. GANGRENE OF THE PHARYNX.

GANGRENE of the pharynx is rare, and has been mostly observed in children. It is an occasional complication of severe forms of diphtheria. It also occurs as a very rare complication of scarlet fever, measles, small-pox, erysipelas, and typhoid fever, or as a result of injuries or operations. Very rarely it is met with as an independent disease, and generally in subjects who are debilitated or cachectic from some cause or other. It has been observed in children and adults, but more frequently in children.

The symptoms, in so far as they are not masked by some concomitant disease, declare themselves by rigors, high fever, and pain in swallowing. The glands under the angle of the jaw, or in the parotid region, are usually swollen and tender. The breath becomes horribly fetid, and there is profuse salivation. The patient rapidly passes into a state of profound adynamia. The pulse is small, rapid, and compressible. Delirium is often present. The prostration rapidly increases, and marked symptoms of collapse supervene, such as coldness of the extremities, pinched face, and blueness of the skin. Sometimes great slowness of the pulse is observed. Towards the end the patient tends to fall into a comatose condition. Sometimes purpuric spots appear, and hæmorrhage takes place from the nose, throat, lungs, bowels, or kidneys. Death almost invariably terminates the case. Recovery has occasionally occurred, but only in cases where the gangrene was circumscribed and of limited extent.

The gangrene, when observed at the outset, appears in the

form of rounded patches on the palate, tonsils, and elsewhere, of a brownish or blackish colour. If the disease remains circumscribed the sloughs tend to separate, leaving ulcers of variable depth. More usually, however, the gangrene is diffuse, the patches becoming confluent, and spreads to neighbouring parts, destroying the soft palate and invading the whole of the pharynx, and reaching the orifice of the larynx and the œsophagus, or spreading to the mouth.

The treatment consists in local antiseptic applications and washes, and a general tonic and stimulating treatment. An attempt should be made to limit the sloughing by application of the cautery or some chemical caustic.

XII. RETRO-PHARYNGEAL ABSCESS.

Causation.—An abscess situated between the pharynx and the vertebral column results, in most cases, from suppuration of the lymphatic glands in this situation. There are two such glands at each side of the middle line, on a level with the axis and third cervical vertebra. These glands are well marked in infancy, and atrophy as age advances. This to a great extent explains the relative frequency of retro-pharyngeal abscess in young children. Retro-pharyngeal abscess is in fact most frequently met with in the first two years of life, and chiefly in the first year, although it may occur at any age. It is met with more often in badly nourished, cachetic children. Inflammatory conditions of the nasal, buccal, and pharyngeal mucous membrane are the starting-point of the malady in many instances. The dependence of the disease on nasal and naso-pharyngeal lesions is easily explained by the fact that the retro-pharyngeal glands receive lymphatics from these regions. Retro-pharyngeal abscess not infrequently originates from one of the infectious diseases, such as scarlet fever, measles, erysipelas, or whooping-cough. Inherited syphilis may also determine its occurrence.

Disease of the cervical vertebræ is sometimes the cause of a chronic retro-pharyngeal abscess, and traumatic causes, such as injury from the passage of an œsophageal tube, or from a foreign body, may give rise to an abscess in this region.

The abscess may occupy the upper or naso-pharyngeal region. Its most common seat is the oral region of the pharynx. Sometimes it is situated in the lower or laryngeal

region. The abscess is usually situated laterally, and not in the median line.

Symptoms.—Retro-pharyngeal abscess usually develops with acute symptoms in children. In addition to the general malaise and febrile condition, dysphagia is the symptom which usually first attracts notice. Even in a young infant, this is easily recognized by the manner in which it throws back its head and cries after each attempt to suck, and sometimes coughs and chokes, and perhaps finally refuses the breast or bottle altogether. Some interference with breathing is usually early observed, and this may soon increase so as to threaten life. Cough, hoarseness, and spasmodic attacks of dyspnoea occur, especially when the patient is lying down. The pain and dysphagia may become so extreme that no nourishment whatever is swallowed, nor even the saliva, which dribbles from the open mouth. The neck may be stiff and inclined backwards or to one side. Sometimes distinct swelling is to be seen and felt in the lateral part of the neck, in the neighbourhood of the lower jaw, on one or both sides.

The abscess usually forms acutely, and the symptoms reach their highest point in from four to eight days. In certain cases, however, the course is subacute, and may cover a period of some weeks. When the disease results from cervical caries the abscess may be, of course, very chronic in its development. In these cases there will be present one or other of the usual signs of disease of the vertebræ in the upper cervical region.

Inspection of the pharynx, and especially palpation with the index finger, will enable the diagnosis to be made. The rapid development of dyspnoea in the course of the case is liable to lead to an erroneous diagnosis being made of some form of croup, if care and attention be not exercised; and in every case where there is any doubt, an exploration with the finger should be made, in order to prevent mistakes. Inspection is often difficult, owing to the age of the patient, and perhaps to a difficulty in opening the mouth. When it can

be made, the pharynx is found red and inflamed, and arched forward, so as to form a distinct prominence. Except in older subjects, the laryngeal mirror is not available, but in them it will sometimes aid the examination, especially if the abscess is low down in the pharynx.

Palpation with the index finger must be mainly relied on. By this means the swelling of the posterior wall, soft and elastic at its most prominent part, can be made out. The examination may provoke an attack of dyspnoea, and may therefore require to be rather rapidly accomplished.

Left to itself, a retro-pharyngeal abscess shows little disposition to evacuation of its contents, and a fatal issue is the rule. By timely interference, however, a favourable result may be anticipated in most cases. If the abscess depends on spinal disease, the ultimate prognosis is of course unfavourable.

Treatment.—As soon as the presence of a retro-pharyngeal abscess is ascertained, it should be opened. This is usually done with a bistoury, the blade of which is covered, except near the point. The child should be held in a nurse's or assistant's lap, and the head thrown slightly back and fixed. With the blade of the bistoury, kept parallel with the vertical plane, an incision should be made at the most prominent point. The head should be thrown forward immediately the pus escapes, to prevent aspiration of pus into the air-passages. A safe method, also, of opening the abscess is to place the patient in a recumbent position, with the head hanging down, or well over on the side, with the head low. As a rule, a rapid cure follows incision in the case of an acute abscess.

In consequence of the impossibility of observing antiseptic precautions when the abscess is opened from the pharynx, some surgeons advise that the opening should be made externally through the lateral parts of the neck. In a chronic abscess, due to cervical caries, this method would seem preferable, but it is quite unnecessary in the ordinary acute abscess.

XIII. HERPES OF THE PHARYNX.

HERPES may occur in the throat in association with a herpetic eruption in the mouth, face, or elsewhere, or as an independent affection. The causation is uncertain. It is frequently attributed to cold, but a neuropathic origin, in some cases at least, is for many reasons probable. On the other hand, it has been observed to occur in an epidemic form, and its onset and course in many cases present the characters of an acute infectious malady. It is rare in very young children, and still more rare in old people. It is met with more frequently in women than in men.

The eruption is generally unilateral, though it has been observed on both sides. It affects the tonsils, the soft palate, uvula, and pillars of the fauces. Very often it affects the posterior wall of the pharynx. Herpes occasionally affects the larynx, when it is observed on the borders of the epiglottis, above the upper orifice of the larynx, or on the vocal cords.

The symptoms begin with chilliness, fever, headache, and general malaise. These general symptoms vary much in intensity in different instances, sometimes being very severe, sometimes almost entirely absent. In the course of a few hours, or a day or so, soreness of the throat is experienced. The soreness is slight at first, and gradually increases. The tongue is usually furred, and the appetite bad. Sometimes there is an increased flow of saliva. In the course of three or four days the fever and general symptoms subside abruptly, and the soreness of the throat gradually disappears. If the larynx is affected, cough, hoarseness, and even symptoms of laryngeal stenosis from swelling of the parts may occur.

On inspection at an early stage, small whitish opalescent vesicles, surrounded by a red blush, will be seen on the mucous membrane of the tonsils, soft palate, pillars of the fauces, or elsewhere. The vesicles may be few or numerous, isolated or in groups, and may coalesce in places. Not unfrequently the eruption is confined to one side, the vesicles not extending beyond the middle line. The vesicular stage is very brief. The vesicles rupture and collapse, leaving a whitish pellicle surrounded by a circle of redness. In a day or two small circular erosions or ulcers form on the site of the vesicles, which gradually heal up in six or eight days. Often, however, the site of the vesicles becomes covered with an opaque, yellowish-white exudation, and by coalescence of contiguous vesicles, more or less considerable patches of false membrane may appear. These false membranes are very adherent, leaving a bleeding surface when removed. They disappear in the course of three or four days. Occasionally extensive and deep ulceration has been observed, and even a gangrenous condition has been known to supervene.

The vesicles do not always come out all at once, but may appear in successive crops, it may be at intervals of a few days. Exacerbation of the general symptoms may accompany the successive outbreaks, thus prolonging considerably the duration of the complaint. Crops of herpes may appear on the face or elsewhere, during an attack of herpes of the throat, and thus, if there has been any doubt, confirm the diagnosis.

In certain females herpes of the pharynx has been observed to recur at almost every menstrual period. This recurrence has extended over a course of several years in some cases.

There is no special treatment for the complaint. A gargle of boric acid and borax (formula 6) will be useful when the ulcers have formed. Sedative inhalations, such as Vap. Benzoini, will sometimes be found to relieve the soreness. Quinine is probably the best remedy to administer internally.

XIV. PHARYNGOMYCOSIS LEPTOTHRICIA.

THE characteristic lesions of this disease were formerly attributed to the growth of the *leptothrix buccalis*. Hence the name. It occurs mostly in youngish and middle-aged subjects, and is commoner in females than in males. It appears, without inflammatory symptoms, in the form of small whitish or yellowish-grey patches, or excrescences, projecting more or less above the surface, situated most frequently on the faucial tonsils; next in frequency on the base of the tongue (lingual tonsil); sometimes also on the lateral fold and posterior wall of the pharynx, and the pharyngo-epiglottic fold; very rarely on the ary-epiglottic fold, the laryngeal surface of the epiglottis, the Eustachian prominences, or the pharyngeal tonsil.

The growths may be very numerous, but do not become confluent. Some are flat, and only slightly raised above the surface; others form club-shaped or mushroom-like growths; while many, and especially those growing from the interior of the tonsil crypts, form long, pointed, thorn-like projections. They adhere firmly to the surface from which they grow, and are of a firm, or even hard, horny, consistence. When removed, they rapidly develop again, even within twenty-four hours. Microscopical examination of the growth shows it to consist principally of stratified layers of squamous epithelium, some granular detritus, and filaments of *leptothrix* fungus. The presence of layers of epithelium in a cornified or horny condition, accounts for the firm consistence of the masses. The disease is essentially of the nature of a keratosis, and pharyngo-keratosis is, therefore, a more exact name for it than

pharyngomycosis. Although the leptothrix fungus is constantly, or almost constantly, present in the growths, it does not appear to have any essential connection with the disease. The manner in which the disease resists simple germicidal treatment confirms this view.

The symptoms are usually not marked, and the presence of the complaint may be merely discovered accidentally. There is generally some discomfort in the throat, such as a feeling of pricking, burning, or dryness. Sometimes there is a sensation of a foreign body, and the patient makes frequent efforts to clear the throat; or a troublesome cough is present. As with most pharyngeal affections, functional voice trouble may occur. In some subjects of the disease, frequently recurring subacute attacks of tonsillitis are observed, but as a rule there is an absence of all inflammatory symptoms. If the disease is left to itself, it usually disappears spontaneously after some months, though sometimes the disease is of more prolonged duration.

The diagnosis is made from the appearance of the patches above described. The mucous membrane in the neighbourhood of the patches does not usually present any appearance of inflammation, unless in the exceptional cases accompanied with the acute symptoms just mentioned. The firm consistence of the masses, and the fact that they adhere strongly to the substance of the tonsil, are peculiarities which serve to distinguish them from the ordinary concretions of the tonsil crypts.

The treatment generally recommended is the mechanical removal of the growths, followed by the application of some escharotic. Chromic acid has been especially commended. Many prefer the galvano-cautery. I have found a strong solution of iodine (formula 14) as effective as any application, combined, of course, with removal, as far as possible, of the deposits. The deposits may, however, reappear again and again, in spite of all treatment. When seated in the tonsils

the growths, as already mentioned, occupy the interior of the crypts, and this constitutes an important cause of the obstinacy to treatment. Slitting up the tonsil crypts is, therefore, a useful adjunct to the treatment. Latterly the application of salicylic acid dissolved in alcohol (1 in 4) has been recommended as a specific. I have not found it more efficacious than other remedies. As the disease tends in course of time to disappear spontaneously, it may be questioned whether active local treatment is called for in cases where no subjective discomforts are present. Semon states that he has found change of air and general treatment give better results than local treatment.

XV. PHARYNGEAL DIPHThERIA.

THE pharynx is the most frequent seat of diphtheria, and therefore, in an account of the diseases of the pharynx, diphtheria requires a place. It would be, however, beyond the scope of this book to give a complete description of this important affection, as this belongs rather to the province of a work on general medicine or on the infectious diseases.

Causation and Nature.—Diphtheria may occur at any age, but is most frequent in children, and especially younger children from two to six years of age. Its occurrence seems to be favoured by cold and damp weather, and it is on the whole more frequent in the colder half of the year. Certain infectious maladies predispose to diphtheria, especially measles and scarlet fever, and, to a less degree, whooping-cough and typhoid fever. Defective drains, and defective house sanitation generally, predispose to diphtheria, probably by producing a liability to throat complaints. Drain-poisoning, however, never originates diphtheria, unless, perhaps, when the sewers have become contaminated with the specific virus of the disease.

The contagiousness of diphtheria has long been recognized. Klebs (1883) first discovered the bacillus, which is now universally admitted to be the specific agent in the causation and propagation of the disease, and Löffler added further confirmation to Klebs's investigation. To MM. Roux and Yersin, however, is due the credit of thoroughly establishing the specific nature of the bacillus of Klebs and Löffler, and the mode of its action. It has now been abundantly proved

that diphtheria is primarily a local infection due to the Klebs-Löffler bacillus, and we must refuse to call any lesion diphtheria, unless it is associated with the presence of this bacillus. The bacilli are to be found almost exclusively at the site of the local infection, especially in the diphtheria membranes, and here they elaborate a toxin which is absorbed into the system, and produces the general symptoms of the disease. It is true that recent investigations have demonstrated that the bacilli, in some cases at least, enter the lymphatics and blood-vessels, and so reach the lymphatic glands, the spleen, and other organs. Their presence, however, in these distant organs is inconstant, and their numbers, in comparison with the site of the local lesions, scanty, so that, for practical purposes, we may regard the disease as a local infection; and it is at the seat of the local lesions, where the bacilli occur in enormous numbers, that the poison is manufactured and passes into the system.

The entry of the diphtherial virus (Klebs-Löffler bacillus) into the throat or air-passages is undoubtedly a necessary condition for the development of the disease. The virus, which is contained in the false membranes and in the secretions of the mouth, throat, and nose of patients suffering from the disease, may be conveyed directly from the patient, as in coughing, etc., or indirectly through the medium of hands, spoons, handkerchiefs, etc. It has been shown that the virus retains its active properties outside the body, for long periods (some months), especially if protected from light and air. From experiments on animals, as well as on other grounds, it is probable that the contact of the virus with a healthy mucous membrane is not followed by ill results. In order to develop the disease it would seem that the virus should reach a surface which is eroded or more or less inflamed. The greater liability of those suffering from inflammatory or traumatic conditions of the throat is well established. It seems probable also that the bacilli may enter a healthy throat

and there maintain their vitality, without ill result to the patient, for a certain period, until the outbreak of an inflammatory attack of some sort, or a slight traumatism, favours the development of the disease. This would account for the variation in the length of the incubation, which in the majority of cases is about two or three days, and may be as short as twenty-four hours, but in certain cases may extend to one or two weeks, or more.

The reception of infectious material from some previous case of diphtheria is therefore to be regarded as the necessary condition for the development of the disease. The various means by which this may be conveyed need not be enumerated. It may be mentioned, however, that milk has been shown to be a not uncommon mode of its conveyance. The milk gets infected by those employed in dairies, etc., or in some accidental manner. It has been held that milk may be infected by the cow itself, since cows sometimes suffer from an affection of the udder and teats of a diphtheritic nature. Cats also suffer from a form of diphtheria, and it has been thought that they may infect human beings. It is, however, very doubtful whether any of the membranous affections which have been described as diphtheria in various animals is identical with human diphtheria, or is capable of producing the disease in the human subject.

Although the Klebs-Löffler bacillus is the specific cause of diphtheria, other micro-organisms are found in the false membranes. Some of these are merely accidental accompaniments, and play no part in the evolution of the disease. Others, especially certain streptococci and straphylococci, are capable of modifying the course of the disease in a greater or less degree. Hence the term "mixed infection," which has been applied to cases of diphtheria in which the symptoms appear to depend partly upon the growth of diphtheria bacilli, partly on that of other micro-organisms. The significance of the association with streptococci has been differently regarded

by various observers, but it is now generally considered to be unfavourable. Certainly many of the serious complications of diphtheria, such as broncho-pneumonia, suppurative otitis media, suppurating glands, septicæmia, and pyæmia may be produced by these organisms. On the other hand, suppuration of the middle ear and broncho-pneumonia may be set up by the diphtheria bacillus.

The diphtheria bacillus as it grows and multiplies on the surface of the throat secretes a toxin. This toxin, by its action, produces alteration and necrosis of the epithelial layer, and provokes a fibrinous exudation from the surface, which, by its coagulation, forms the false membrane. This diphtherial false membrane, when recently formed, is thin, white, and sometimes semi-transparent. Later its thickness increases, reaching, it may be, two or three millimetres. It becomes firmer, more opaque, and of a greyish or yellowish-white colour. In some cases the membrane has a brownish tinge, or it may be black, owing to hæmorrhage from the underlying mucous membrane. In structure it is composed of a fibrinous network of varying density, in the meshes of which are leucocytes, altered epithelial cells, red corpuscles, and bacteria. The mucous membrane beneath the false membrane is denuded of its epithelial layer, and more or less inflamed. The bacilli of Klebs are demonstrable in all diphtherial membranes, and usually in all parts of the membrane, but chiefly at the free surface.

On the tonsils the false membrane penetrates into the crypts for a varying distance, sometimes stopping short near the orifice, sometimes lining the whole interior of the cavity. In the infra-glottic region of the larynx, as well as in the trachea, the membrane is less adherent and thinner than in other parts.

When the fibrinous transudation and the emigration of leucocytes come to an end, beneath the false membrane, the epithelium begins to reform. Mucus is secreted beneath the

membrane, and leads to its separation. After separation of the membrane healing takes place, and no scarring occurs unless there has been destruction of the mucosa. The bacilli diminish and disappear with the membrane, but in some cases bacilli may remain in the throat for weeks after apparent recovery. In exceptional instances, indeed, the bacilli, in full virulence, have been demonstrated in the throat, after much longer periods.

It must be mentioned that a diphtherial affection of the throat may exist without the formation of false membrane. This latent form of diphtheria cannot be distinguished by a mere inspection from a simple inflamed throat, and can only be demonstrated, in a suspected case, by the discovery of the bacillus in the secretions.

Symptoms and Course.—Cases of pharyngeal diphtheria vary much in their clinical characters, and no exact classification of the clinical forms is possible. The variations in intensity and character of the symptoms depend partly on the degree of the diphtherial lesions, and the virulence of the bacilli, and partly on the susceptibility of the patient. In addition to these factors, however, we have in some cases to deal with the combined effect of the Klebs-Löffler bacillus, and other micro-organisms, usually streptococci, of greater or less virulence. Streptococci are found in the false membranes in the great majority of cases of diphtheria, but it is only when present in great numbers, or perhaps with a certain degree of virulence, that they modify the course of the disease. Other micro-organisms, especially certain staphylococci, produce similar results, but at present it is impossible to differentiate from each other the various forms of coccus infection, by their clinical character, and strepto-diphtherial infection serves as the type of so-called "mixed infection."

It is possible, therefore, provisionally, at least, to separate cases of diphtheria into two main groups, viz. cases of pure diphtheria, and cases of mixed or strepto-diphtherial infection.

Pure diphtheria may be further divided into the ordinary and toxic forms, and cases of mixed infection into the less severe cases, in which the complications due to streptococcic infection remains more or less localized, and the more severe or malignant forms, in which, in addition to severe local complications and marked toxemia, there is a general septicæmic infection.* Various gradations, however, occur between one form of the disease and another, as one form may pass into another at any moment.

In the ordinary type of pure diphtheria the onset is somewhat insidious. The patient merely exhibits some malaise, is easily fatigued, and there is slight febrile disturbance. The sore throat, slight or absent at first, becomes more definite after two or three days. At the same time some slight enlargement of the cervical lymphatic glands under the angle of the jaw takes place. The glandular enlargement may increase more or less as the disease progresses, but the glands remain throughout movable and free from surrounding infiltration. As the throat lesions increase, there may be considerable pain and difficulty in swallowing, and the voice may become thick. The fever rarely increases beyond 102° F., but the pulse may vary from 100° to 120°. After a few days the fever usually diminishes or disappears, without, however, any necessary amelioration in the patient's condition, as he often remains pale and prostrate. The throat begins to improve at the end of five or six days, and all soreness has usually disappeared in from eight to twelve days. The glands have nearly subsided at the same period, and the appetite and strength improve, but pallor often persists, and convalescence is often prolonged. The course of the mildest case may be seriously complicated by the formation of membrane in the larynx, and during convalescence from any form of diphtheria the danger of cardiac

* This is the classification adopted by M. Ruault in his article, "Diphtherie. Traité de Médecine." MM. Bouchard et Brissaud. 2^{me} ed. Paris, 1899.

failure, and the possibility of paralysis, sometimes of a serious nature, have to be kept in view.

If the throat is examined at the onset, a little redness is observed. After a day or a day and a half, the false membrane begins to appear in the form of rounded or oval, whitish, opaline patches; usually one such patch on one tonsil first appears, but two or three patches may commence simultaneously. Other patches subsequently appear on the tonsils, uvula, or soft palate, less often on the pharyngeal wall, and spreading at their margins, unite with neighbouring patches, so as to form continuous, smooth, white, or yellowish-grey layers. In this way, in the course of two or three days, the tonsils, uvula, and soft palate may be more or less completely covered. When a portion of the membrane is artificially detached, it leaves a red, sometimes slightly bleeding surface, upon which, in the course of a few hours, fresh membrane is reproduced. The membrane ceases to extend after a few days, becomes less adherent, and is detached spontaneously, to be replaced by less extensive and thinner membrane. This may occur several times in some cases, but each time the membrane is thinner and less extensive. Finally, at the end of from seven to twelve or fifteen days, it ceases to be reproduced.

Occasionally patches of membrane appear in the mouth or on the lips. More often extension of the membrane to the nasal passages takes place causing obstruction, and perhaps a slight serous discharge, aggravating and prolonging the case. Extension of the disease to the larynx is, however, the most serious complication, and unfortunately a sufficiently frequent one in children.

In certain mild cases of diphtheria, which are sometimes termed abortive, the membrane remains very thin and limited in extent, and disappears quickly without being reproduced, the general symptoms being also proportionately slight and short in duration. Between such cases and the more ordinary form every gradation may occur.

Certain abnormal cases should also be mentioned in which the ordinary diphtherial membrane is absent, and the disease assumes the type of a catarrhal or follicular tonsillitis. Such cases frequently begin with a very sharp rise of temperature, and run a short and benign course like the diseases they simulate. Their true nature is usually not suspected, and can only be determined by bacteriological examination. A case of this kind is, therefore, very apt to spread infection, but, apart from this, it may, at any period of its course, take on a serious character.

A very prolonged form of diphtheria has occasionally been observed, in which diphtherial membranes have continued to be reproduced in the throat for weeks or even months after the general health had become practically re-established. In some instances the false membrane has gone on reforming for as long as nine months. It seems possible that in these prolonged cases the contagiousness ceases after a time, but of this there is no certainty. It is probable, however, that the virulence of the bacilli has so far diminished that they produce little or none of the usual toxic products. M. Ruault has observed a case of this kind, in which, after four months, the membrane spread to the larynx with a fatal result.

The toxic form is characterized by a profound intoxication, which may be present from the very onset, or may appear in the course of a case beginning in the normal manner already described. The local lesions, generally, though by no means invariably, develop and spread more rapidly than in the ordinary form. The false membranes are usually abundant and thick, and cover all the parts of the throat. The glands are generally more swollen, though remaining distinct and free from infiltration. The patient rapidly sinks into a state of torpor and complete prostration. The face is pale and livid. There is complete anorexia, and vomiting is frequently present. The temperature generally rises high, to 103° or 104°, but may sink to subnormal before death. The pulse is

frequent, small, compressible, often irregular. Death may ensue in thirty-six or forty-eight hours, and may be ushered in by coma and convulsions, or life may be prolonged for several days, with some fluctuation in the symptoms, but recovery is very rare once these intensely toxic symptoms have declared themselves.

The strepto-diphtherial form of the disease presents many varieties in the character and severity of the symptoms; but, as already mentioned, it assumes two main types, one of less severity, characterized rather by aggravation of the local lesions than by any intensity of the general symptoms, and the other, the more severe or malignant type, characterized by severe local lesions, coinciding with symptoms of marked diphtherial intoxication, combined with those of general streptococcic infection. The attack may assume either of these types from the onset, or a case beginning as pure diphtheria may, at some period of its course, assume the character of a mixed infection. Again, the less severe form of mixed infection may at any moment pass into the malignant type.

In the less severe type, the general symptoms, on the whole, resemble those of the ordinary form of pure diphtheria, while the throat lesions partake more of the character of those of the form to be next described, though less severe. The onset is usually marked. The temperature rises rapidly to 102° or 103° Fahr., and usually persists high for several days. The soreness of the throat is marked from the onset. The glands in the neck are enlarged, and there is more or less infiltration of the cellular tissue around them. The throat is red and swollen at an early stage, and the false membranes form thick and abundantly. There is usually much mucopurulent secretion in the throat, and the parts easily bleed. The membrane frequently invades the nose, setting up a profuse purulent discharge. The breath is often offensive. The duration of the disease, though variable, is in general more prolonged than in the ordinary form, and the convalescence

is slow. The greatest danger is from extension to the larynx, which is very common in this form. Broncho-pneumonia is of frequent occurrence, even apart from involvement of the larynx.

In the severe form of strepto-diphtherial infection, the onset of the disease is mostly sudden. The attack may be ushered in by rigors, and the temperature often rises high, though it sometimes keeps low throughout, or sinks to normal or subnormal as the signs of prostration and collapse increase. The pulse is frequent and small, and the patient is very quickly prostrated by the virulence of the infection. The face is pallid, and becomes puffy, dusky, and livid. The cervical and submaxillary glands enlarge rapidly, and the whole neck becomes infiltrated and brawny, and the skin is tense, shiny. A patchy redness often appears on the skin of the neck and face. The throat is red and swollen, and painful, from the onset. The tumified parts rapidly become covered with thick membranes, which soon assume a brownish or blackish colour. The membrane tends to invade the mouth, and spreads rapidly to the nasal fossæ. A sero-purulent or sero-sanguinolent discharge runs from the corners of the mouth and from the nose, and the breath is horribly offensive. Deep destruction of the tissues of the throat often takes place, and profuse hæmorrhage may occur from eroded vessels. The prostration rapidly increases. Occasionally a little delirium is present. The tongue is brown and tremulous. Diarrhœa is not uncommon. The pulse becomes thready and irregular. Death from collapse or syncope occurs usually within a few days. In very malignant cases the patient may succumb to the virulence of the disease before the false membranes have developed to any extent, or at all. On the other hand, the case may be prolonged for ten or twelve days or more, during which various complications may appear, such as extension of the membrane to the larynx, conjunctiva, or ears, broncho-pneumonia, hæmorrhage, purpura, suppuration of lymphatic glands, etc. In rare cases recovery may ultimately take place.

Complications.—In the course of a case of diphtheria, membrane may appear on the neighbouring mucous surfaces, spreading from the pharynx by continuity, or appearing as separate patches. Patches of membrane may thus develop on the inside of the cheek, lips, or tongue. Membrane is occasionally discovered, *post-mortem*, in the œsophagus and stomach. Extension to the nose is common enough in all forms. In milder cases the formation of membrane in the nose gives rise to obstruction, but no marked discharge. Extension to the nose is, however, apt, in all cases, to be attended with an aggravation of the general symptoms. In cases of a severe septic character invasion of the nose is the rule, and is announced by an abundant, thin, more or less sanguineous discharge, which erodes the nares and upper lip. There may be profuse epistaxis. It is in this form, too, that extension of the disease to the conjunctiva through the lachrymal canal is chiefly observed. Invasion of the Eustachian tube and tympanum sometimes occurs, especially in cases secondary to scarlet fever, and is attended with a fetid sero-purulent discharge from the external meatus, on the surface of which false membranes may form.

Although, as just stated, extension to the nose is apt to be attended by aggravation of all the symptoms, nevertheless, primary nasal diphtheria is sometimes observed, running an extremely mild and somewhat chronic course. These mild cases, formerly regarded as non-diphtherial, have been alluded to in the section on Membranous Rhinitis (see p. 113).

The most important and serious extension of the diphtherial membrane is that to the larynx and lower air-passages, a complication especially liable to occur in children. When it occurs, it usually supervenes within three or four days from the onset of the pharyngeal disease, and seldom commences after the eighth day. The occurrence of extension to the larynx is indicated by hoarseness and croupy cough, and

finally by signs of laryngeal stenosis. Laryngeal diphtheria may, of course, be primary.

Destruction of the tissues of the throat, to a greater or less extent, may occur in the strepto-diphtherial form of the disease. The mucous membrane alone is usually involved, but sometimes the deeper parts are affected, and in the cases that proceed towards recovery, losses of substance in the tonsils, pharyngeal wall, pillars of the fauces, or soft palate, may be observed. Profuse hæmorrhage may occur from the throat in the course of the case.

Suppuration of the lymphatic glands of the neck is a rare complication of diphtheria. It is most frequently observed in cases secondary to scarlet-fever. It may occur during the height of the disease, or towards the termination, when the membrane has in part or wholly disappeared.

Albuminuria is common in all forms of diphtheria, and certainly occurs in more than half the cases observed. It depends upon nephritis, which results from the poison of the disease. It varies much in degree, but is on the whole more marked and more constant in the virulent forms. It may commence quite early, on the second or third day, and in most cases it disappears after a few days, but it may persist into convalescence, and for a variable time after apparent restoration of health. Diminution in the quantity of urine is observed in some severe cases, and it may pass on to complete suppression in certain cases which almost always terminate fatally.

Erythematous eruptions appear on the skin in some cases of diphtheria. It is mostly in the strepto-diphtherial cases that they are observed, in the less severe as well as in the more severe types. The most frequent sites of the eruption are the wrists, elbows, knees, ankles, and buttocks. The erythema may assume a multiform, measly, or scarlatiniform character. It is generally rather transitory, lasting at most three or four days.

Paralyses of various kinds are a frequent and well-known

complication or sequel of diphtheria, occurring in a proportion variously estimated at from ten to twenty-five per cent. of the cases. Mild attacks are as often followed by paralysis as severe attacks, but the graver cases of paralysis are more frequently the result of severe attacks. Adults are more liable to be affected than children. The period at which diphtherial paralysis usually makes its appearance is about a week or fortnight after the cessation of the disease in the throat. Occasionally it is as late as a month after recovery. On the other hand, paralyzes sometimes appear during the course of the disease on the fifth or sixth day, or even earlier. These early forms are often more transitory than those which occur at the usual period. It has been shown that diphtherial paralysis is due to certain changes in the peripheral nerves, and that these changes are produced by the toxin developed by the diphtheria bacilli, and absorbed into the system. It may, therefore, be regarded as a peripheral polyneuritis of toxic origin.

The gravity of diphtherial paralysis depends very much on whether it is limited to the soft palate and pharynx, or whether it tends to become generalized. In four-fifths of the cases met with it remains limited to the throat, and in the majority, the soft palate muscles alone are implicated. The muscles of the larynx are much less frequently affected than those of soft palate. If the pharyngeal constrictors are affected, serious difficulty in swallowing may arise. The ocular muscles are pretty frequently affected, especially those of accommodation. After the throat and eye, the muscles of the lower limbs are most frequently implicated. The knee-jerk is usually lost early. The muscles of the upper limbs, of the neck or trunk, may be involved, and should the diaphragm and intercostal muscles be involved, serious respiratory troubles will of course arise. The bladder and rectum are rarely affected.

Certain formidable symptoms are sometimes attributable to implication of the pneumogastric nerve, and lead to a rapidly

fatal termination. These are nausea, vomiting, abdominal pains, palpitation, irregularity of the heart, and syncope.

Sensory symptoms are not uncommon. Loss of sensation in the limbs sometimes occurs, chiefly towards the extremity of the limbs. Loss of sensation of the soft palate and pharynx is not uncommon, and the anæsthesia may involve the upper orifice of the larynx. In the latter case there is a liability to the entry of particles of food into the larynx and bronchi.

The duration of diphtherial paralysis is very varied. When it affects the throat alone it mostly disappears in a few weeks. When the throat and lower limbs are affected, it usually disappears within a month or six weeks. On the other hand, if the muscles of the upper limbs or trunk are implicated, it may last several months or even a year. As it is disappearing from one part of the body it may begin, and progress, in some other region. When a part has begun, decidedly, to improve, there is never any relapse of the paralysis in that part. The order of improvement is not always the same as that of the appearance of the symptoms, the parts least affected usually improving first, even though they were affected later. The sensory symptoms usually improve before the motor symptoms.

The course of diphtheria varies much in consequence of the difference of type of various cases, and the various complications and accidents which may intervene. The actual time during which false membranes continue to appear, varies from a minimum of four or five days in the mild type of the disease, to three or four weeks, or even longer, in the severer forms. When recovery takes place the convalescence is often prolonged, and may be interrupted by various accidents of more or less gravity. The throat often remains permanently susceptible after severe attacks, and more or less marked signs of chronic pharyngitis may persist. Death is a frequent termination of the disease. It may result from the effects of the diphtherial poison or septicæmia. In a large number of cases death is due to extension of the disease to the larynx, and to broncho-

pneumonia. It may occur also from heart failure, dependent on myocarditis or on implication of the pneumogastric nerve. In this way arise the sudden deaths which are unfortunately not very uncommon in the course of, or during convalescence from, all forms of the disease.

The prognosis in every case of diphtheria is more or less grave. However mild the symptoms may be, one is never sure that the disease may not suddenly take on a severe form, or that some grave complication may not set in. The severity of the disease varies in different epidemics. In some, nearly every case is of extreme gravity, while in others the cases are all relatively benign. In general, younger children bear the disease worse than older children and adults. Diphtheria, secondary to scarlet fever, measles, whooping cough, etc., is always more fatal than the primary form.

The diagnosis of diphtheria can in most cases be made by careful attention to the throat lesions, and to the general symptoms and the history. In many cases, however, considerable difficulty will be experienced, and sometimes it is quite impossible to pronounce an opinion without a bacteriological examination. Allusion has already been made to cases which exhibit merely the signs of a simple sore throat, without any membrane, and which are, nevertheless, undoubtedly diphtherial in nature. On the other hand, all membranous throats are not diphtherial (see p. 346). The bacteriological test is thus the only means of making a certain diagnosis. To meet the exigencies of practice, however, we must, for various reasons, be prepared to form some opinion on the spot, founded on the history of the case, the appearances of the throat, and other signs and symptoms. The presence of certain characteristics may help to a probable diagnosis, but it is rather by the reunion of several of these, than by the presence of any one, that an opinion can be formulated, as they are all inconstant and unreliable. The insidious onset, the presence of the characteristic membrane appearing and spreading as already

described, the glandular enlargement, the early pallor and prostration, the frequent small pulse combined with moderate elevation of temperature, the albuminuria, these and other factors help towards the diagnosis, though none of them is alone reliable. The history of exposure to infection will, of course, have much weight, however doubtful the appearance of the throat may be.

Treatment.—It is unnecessary to enter into all the details of the treatment of diphtheria in this work. The usual hygienic rules for infectious cases, both in regard to the patient and the sick-room, must be observed. Special precautions must be taken in view of the infectious nature, not only of the false membranes, but of the secretions from the nose, mouth, and throat.

A most important indication in the treatment is to support the strength of the patient, from the commencement of the attack, with light and nutritious diet, administered at frequent intervals. The patient must, of course, be kept strictly in bed, not only during the disease, but until convalescence is thoroughly established. In most cases some alcohol should be given from the commencement. Brandy is, I think, as a rule, the best form in which to give it. In any case we must be prepared to administer alcohol as soon as the least suspicion of cardiac weakness is observed, and in certain cases alcohol may be required to be given in very free and frequently repeated doses.

The only treatment for which a specific action can be claimed is the treatment by antitoxic serum. As to its beneficial effect on diphtheria, the statistics published in this country and abroad, during the last few years, leave no room for doubt. Quite apart from statistics, however, no competent observer who has had experience of the treatment can fail to have recognized its efficacy in individual cases. There is, indeed, ample ground for believing that if cases can be treated at the commencement of the disease, the mortality will not exceed five per cent., as originally predicted by Behring.

To begin the treatment early in the disease is indeed a vitally important matter. No time should be lost, and in all cases in which the signs point strongly to diphtheria, the serum should be injected without waiting for a verification of the diagnosis by bacteriological examination. In suspicious cases, in which the symptoms are mild, we may wait for the result of the bacteriological examination, but the patient should be watched, and if any marked aggravation of the symptoms occur in the meantime, the serum should be injected at once. In any case, however slight, in which there is the least symptom of commencing involvement of the larynx, an injection should be made at once without waiting for the bacteriological examination. Delay in such a case is especially dangerous. If a bacteriological examination reveals no diphtheria bacilli, the serum treatment is not indicated, but it is often desirable in these cases to have a second examination made.

It is generally held that the initial dose, even in a mild case, irrespective of age, should be 3000 to 4000 normal antitoxic units, though for infants under one year a dose of 2000 units suffices. In severe cases 6000 units should be injected. A second dose of the initial strength may be required, if there is no improvement, especially if the case is severe, in twelve hours, and a third dose after a similar interval.

The serum is injected subcutaneously either on the abdomen, or in the lumbar region, or between the shoulders. Strict antiseptic precautions should be observed. For this reason a syringe, such as that recommended by the Jenner Institute of Preventive Medicine, which can be conveniently boiled, is the best to use.

As a rule, the injection of the serum is followed in the course of twenty-four hours by marked signs of improvement. The temperature falls, the pulse-rate declines, and the membranes show signs of separating. There may, however, be a temporary rise of temperature immediately following the injection. In two or three days the membranes separate and

are not reformed, and the general condition of the patient has undergone marked improvement. In the type of cases described above as strepto-diphtherial or mixed infection, the effects of the serum, both on the local lesions and the general condition are less marked, and in the grave septicœmic cases, it may not sensibly retard the fatal issue.

In a certain proportion of cases, the injection of the serum is followed by an urticarial eruption, after the lapse of a few days or a week. This may be accompanied by a slight rise of temperature. These symptoms pass off in a few days, and are attended with no serious consequences. Less frequently, about the twelfth or thirteenth day after the injection, an erythematous eruption, accompanied by a sharp rise of temperature, is observed. At the same time, some pain and swelling of various joints may be present. These symptoms begin to abate in from two to five days. Their frequency and intensity appear to bear no relation to the dose of serum employed. Though not dangerous, they are sometimes sufficiently troublesome to indicate the advisability of not injecting the serum unnecessarily.

However efficacious the serum treatment may prove to be, it is often desirable to supplement its action by employing such general and local remedies as experience has shown to be of use in combating the disease. It is true that the rapid effect of the antitoxic serum, in certain cases, undoubtedly leaves less room for their employment than formerly. In many instances, however, we have to deal with cases in which, for some reason, the serum treatment has been commenced at a late period of the disease, too late to exert its full influence. Again, we may have to deal with cases of so-called mixed infection, with marked septic symptoms, upon which the diphtheria antitoxin has no effect.*

* So far as can be judged from the reports of various observers, the combination of anti-streptococcic serum with diphtheria serum in these cases, has not proved to be of any appreciable value.

Among internal remedies perchloride of iron has probably been most widely used. I feel sure it is a useful remedy, and I am disposed to give it from the onset in every case of diphtheria in moderately full and frequently repeated doses, either alone or in combination with other drugs. The drugs most useful in combination with iron are strychnine and quinine. Strychnine is perhaps indicated especially in the second week and onwards, the period when cardiac weakness is most likely to show itself. Quinine is likely to be useful in cases with high temperature and septic symptoms. Various other drugs may, of course, be indicated by the special symptoms of the case.

Local treatment is also important, the object being to remove or destroy the diphtheria bacilli and other pathogenic micro-organisms that may be associated therewith, and at the same time to remove as much as possible of the toxic material that has not been already absorbed. Even with the serum treatment, we should attend to these indications in all severe forms of diphtheria.

Careful systematic removal of the membrane undoubtedly fulfils to a large extent the above indications, and in tractable patients, in whom it can be done without mechanical injury to the parts, it is no doubt beneficial. By pressing a swab of cotton wool against the surface of the membrane, and withdrawing it with a rotatory movement, the membrane may be detached. A pair of forceps may be cautiously used to remove fragments of membrane.

Disinfectants and germicidal substances may be used in a more or less concentrated form by applying them directly to the throat, or in a weaker strength, as sprays, gargles, douches, or vapour inhalations. We have to a great extent to select the method of application according to the age and amenability of the patient, and the nature and severity of the case. There is no doubt, in my mind, of the superior value of direct application of the stronger antiseptics, when this can be done at sufficiently frequent intervals, without undue disturbance of

the patient. An application should certainly be made at least three or four times in twenty-four hours. The application should be made with a swab of cotton wool fixed on the end of a holder. Among the remedies which may be used in this way are glycerine of carbolic acid (half or two-thirds B.P. strength), corrosive sublimate solution (1 in 1000), and peroxide of hydrogen, in a twelve or fifteen volume solution, employed pure or diluted to half or third strength.

I have no doubt about the value of the frequently repeated plentiful use of disinfecting gargles and mouth-washes, especially in the severe and septic forms, where there is much secretion, often offensive in character. Spraying is much less effectual. The most efficacious method of cleansing and disinfecting the mouth and throat in these cases, is by douching the throat with a jet of warm boric-acid solution. This may be done from a ball syringe, a Higginson's syringe, or a douche apparatus. This operation can be very well performed with the patient lying on one side, with the head near the edge of the bed, a waterproof sheet being arranged to catch the fluid as it runs from the patient's mouth. As a gargle and mouth-wash for frequent use, the borax and boric-acid solution (formula 6), or chlorine (formula 8), or carbolic acid and lime-water (formula 9) may be prescribed.

Since the introduction of the serum treatment there is less need than formerly for local treatment. The majority of cases, in which we have been able to commence the serum treatment sufficiently early, will need little other treatment. In such cases as we deem it advisable to make local applications, every effort should be made to spare the patient's strength. With a little management we can make all our applications without raising the patient's head from the pillow. In some cases the patient's general condition is such that little hope can be expected from local treatment, and we must then hold our hands and refrain from jeopardizing the faint chance that still remains.

Some authorities recommend keeping the patient in a constant atmosphere of steam by means of the bronchitis kettle. This procedure is, however, only of service if signs of laryngeal or bronchial troubles are present. Extension of the disease to the larynx may of course require intubation or tracheotomy for the purpose of relieving the dyspnoea.

It has been repeatedly shown that the diphtheria bacillus may persist in the mouth and throat for many days, or weeks, after the disappearance of the membrane. It is, therefore, desirable to continue local disinfection with mouth washes, gargles, or sprays during convalescence. The possibility of infection during this period should also be borne in mind, and, where possible, bacteriological examination of the throat should be made during convalescence, as the patient cannot be pronounced free from infection until the bacilli have completely disappeared.

XVI. HÆMORRHAGE FROM THE PHARYNX.

APART from lesions, accidental or operative, from ulcerative or gangrenous processes, or from general conditions, such as scurvy, hæmophilia, etc., hæmorrhage from the throat is very rare. Indeed, *unless a bleeding point has been seen*, we must be very cautious in concluding that the throat is the source of blood which is expectorated. Nevertheless, it is well established that hæmorrhage may occasionally be produced by coughing or retching in individuals in whom there is present a congested state of the pharynx, or a varicose condition of the vessels of the pharyngeal wall or the base of the tongue.

Hæmorrhage apparently proceeding from the throat is sometimes due to a flow of blood from the nose passing back through the posterior nares. A well-recognized source of slight hæmorrhage from the throat is the pharyngeal tonsil, in children, or even in young adults affected with adenoid vegetations. It is well known how easily bleeding occurs, when we pass the finger, even gently, into the naso-pharynx, in such subjects. Spontaneous hæmorrhage from this region occurs mostly at night. Blood, mixed with saliva and mucus, trickles on to the pillow, or is found caked about the lips and teeth in the morning. Sometimes blood is spat out in the morning, and sometimes a little blood will be spat out in the daytime, from the same source.

When a bleeding point is detected in the pharynx there is no better treatment than the application of the electric cautery point. Bleeding from the pharyngeal tonsil is generally accompanied by other indications of hypertrophy demanding the removal of the vegetations.

XVII. FOREIGN BODIES IN THE PHARYNX.

THE foreign bodies which most frequently lodge in the pharynx are fish-bones, pins, and needles; but false teeth, even whole sets, bristles, coins, buttons, lumps of meat, and various other bodies are not unfrequently met with. Sharp-pointed objects may stick anywhere, oftenest, probably, about the fauces and tonsils. Foreign bodies of various kinds are apt to lodge between the base of the tongue and epiglottis, or in the lower part of the pharynx, in the pyriform sinuses, or behind the arytenoids. It is very rare for a foreign body to stick in the naso-pharynx.

The symptoms are usually some pain and discomfort, chiefly felt in deglutition. Large foreign bodies lodged about the laryngeal orifice may give rise to dyspnoea. Hard substances, embedded in the tissue, may give rise to inflammatory troubles or abscess. Perforation of the carotid artery, with fatal hæmorrhage, has been known to occur from the penetration of needles and such-like bodies.

On the other hand, foreign bodies, even of considerable size, have lodged in the pharynx for very long periods without causing any marked symptoms.

The removal of a foreign body from the throat rarely presents much difficulty when the exact nature and position of the object have been made out. When a patient comes complaining of a foreign body in the throat the history will often indicate its nature. In any case a careful inspection of the throat with a good light should always be made before any other procedure is attempted. In doing this we should

make a careful and systematic examination of all the parts, and too much reliance should not be placed upon the sensations of the patient with respect to the localization of a foreign body. The power of localization of sensations in the throat is known to be very defective. In order to explore the laryngeal region of the pharynx, it will be necessary to employ the reflector and laryngeal mirror. Especial attention should be directed in this region to the pyriform sinuses. If, after a thorough inspection, nothing can be made out, and there is nevertheless reason to believe that something is lodged in the throat, a thorough exploration should be made with the finger. A small fish-bone or a body lodged in the folds at the side of the larynx or elsewhere may be thus detected, and a forceps may be guided down to it. The disadvantage of palpation is that one may drive small sharp-pointed bodies still further into the tissues. It should, therefore, not be resorted to until careful inspection has failed. In children, of course, palpation may be the only method available.

When a foreign body has once been detected, its removal should be at once proceeded with. This is generally best effected with either an ordinary straight forceps or a curved laryngeal forceps. The procedure is often much facilitated by the application of cocaine to the throat. It is hardly ever justifiable to attempt to push a foreign body down into the œsophagus. Certainly no attempt should ever be made to push a pointed or angular body forcibly down, as grave accidents have resulted from such attempts, though occasionally a soft body, such as a lump of meat, lodged at the upper orifice of the œsophagus, may be so treated. If a foreign body is causing symptoms of imminent suffocation, it may be necessary to proceed at once to tracheotomy before attempting its removal. Emetics, which were formerly in vogue for removal of foreign bodies, should never be employed. Apart from their uncertainty, there is always a possibility that in retching the displaced foreign body may enter the larynx.

When a patient complains of a foreign body in the throat, and careful examination fails to reveal its presence, we may wait for a day or two before we renew our manipulations. It often happens in such cases that none is present. In some cases we have to deal with hysterical patients who imagine they have something sticking in the throat, and such feelings may persist for indefinite periods in spite of all assurances to the contrary. In other instances it happens that some sharp body has irritated or injured the surface in its passage, possibly lodged for a time, and been ejected before the time of our examination, and the feeling of something sticking in the throat persists. Such sensations will usually pass off in a few hours, or a day or so, especially when the patient is assured that there is nothing present.

XVIII. MORBID GROWTHS IN THE PHARYNX.

1. BENIGN GROWTHS.

ALMOST every variety of new growth has occasionally been met with, taking origin in the pharynx. They are nearly all, however, of very infrequent occurrence. **Papillomata** are not uncommon, and are found growing chiefly from about the free margins of the pillars, or from the uvula, sometimes from the tonsils or posterior wall of the pharynx. **Mucous cysts** are also not very uncommon. **Fibromata** occasionally occur in the tonsil, soft palate, or pharyngeal wall. These tumours, in some instances, become pedunculated, and thus may hang down some distance into the œsophagus, being carried there by the movements of deglutition. A pedunculated tumour, composed of tonsil tissue (accessory tonsil), has sometimes been observed growing from the tonsil. Pure **adenomata** and **myxomata** of the soft palate have occasionally been observed, though more frequently the tumour is of a mixed character, of the nature of **adeno-fibroma** and **adeno-myxoma**. Among other rare tumours of this region are **lipomata** of the soft palate or pharyngeal wall, and **echinococcus cysts**, and **fibrochondroma** of the tonsil. An **exostosis** from the spinal column may also form a tumour in the pharynx.

The symptoms depend on the situation of the tumour, and on its size and shape. Small growths from the soft palate and tonsils give rise to no symptoms. Larger tumours may interfere with speech or deglutition. Tumours which hang down or encroach on the laryngeal region may excite attacks

of coughing or dyspnoea. The removal of warty or pedunculated growths is easily accomplished with the scissors, cold or electric snare, according to circumstances. Non-pedunculated growths can generally be enucleated after incision of the mucous membrane over them, but the exact steps of the operation must depend on the nature and attachment of the tumour.

2. MALIGNANT GROWTHS.

The most frequent seat of malignant disease in the pharynx is the tonsil, and next to this, the soft palate (inferior surface), and especially its anterior pillar. A frequent point of origin is the junction of the anterior pillar and the tongue; but these cases are rather to be considered as cancer of the tongue.

Epithelioma is the commonest form of malignant disease in the pharynx, but sarcoma, lymphoma, or lympho-sarcoma (of the tonsil), scirrhus, and encephaloid, all occur in this region. Sarcomata are usually met with in young subjects; the other forms of malignant disease appertain to middle or advanced life. Males are affected much more frequently than females.

Malignant disease of the pharynx does not always cause marked symptoms in its early period, and the disease may be well advanced when the patient comes to seek advice. Some discomfort or pain in swallowing is usually the first symptom, slight at first, and gradually, though perhaps very slowly, becoming more severe. Pain is a more marked symptom in epithelioma than in sarcoma. In some cases earache, or a pain shooting up from the throat to the ear, is the earliest, and, for some time, the only symptom. Again, it may happen that swelling of the lymphatic glands beneath the angle of the jaw develops before any pain or discomfort has called attention to the primary disease, which has been insidiously progressing in the throat. The glands are early affected in malignant disease of the tonsils, but in some sarcomata, especially of

the spindle-celled variety, the tumour may remain encapsuled for a considerable time, and the glands continue unaffected (*Newman*).

As the disease advances, pain and dysphagia usually become prominent symptoms. Pains radiate from the throat in various directions, especially towards the ear. Earache of an intense shooting character, spontaneous or evoked by swallowing, is often the chief source of the suffering endured by these patients. Gradually, swallowing becomes more painful, solids and, finally, liquids are refused. Salivation is often a marked symptom, large quantities of saliva, up to two or three pints or more, being discharged daily. The voice becomes thick and indistinct, and respiration may be impeded. The breath is often very fetid. The duration of the disease may vary from a few months to four or five years. Death results eventually from inanition, or from asphyxia, hæmorrhage, pneumonia, etc.

Examination of the throat is not always easy, especially if the disease is at all advanced, as there is apt to be some constriction of the jaws, and depression of the tongue is often painful. Digital palpation will often be a useful supplement to inspection of the throat. At an early stage an enlargement of one tonsil may alone be visible, which on palpation has an indurated feeling, and such a condition in a person advanced in life should be regarded with suspicion. Ulceration is mostly an early event in malignant tumours in the throat. The appearances vary according to the size and character of the growth, and in general bear resemblance to similar growths in the tongue and other regions. It may be remarked that growths originating in the tonsil tend to spread first to the anterior pillar, and thence on to the soft palate.

The diagnosis, as a rule, presents little difficulty. When there is any doubt, the removal of a small portion of the growth for microscopic examination can be made. A primary syphilitic sore on the tonsil has occasionally been confounded

with epithelioma. The diagnosis from tertiary syphilitic ulceration will more often be a source of difficulty. The presence of fixity and induration of the parts, the enlarged glands in the neck, and the negative effect of iodide of potassium, will help to establish the diagnosis. It may be remarked, however, that sometimes malignant ulceration seems to improve for a time under iodide of potassium.

Treatment.—When discovered sufficiently early, the extirpation of the disease by surgical means has been had recourse to with a certain measure of success, as may be seen by consulting recent treatises on the surgery of this region.

In most cases palliative treatment alone is possible. Antiseptic and anodyne applications must be employed to the ulcerated surface, and anodynes administered internally, according to the indications of the case.

XIX. SYPHILIS OF THE PHARYNX.

1. ACQUIRED SYPHILIS.

A primary sore or chancre is occasionally met with in the throat. Instances have been recorded of its occurrence at almost every part of the pharynx, but the seat of election is the tonsil. Chancre of the tonsil is usually single, but cases of chancre on each tonsil have been met with.

When the sore has a typical aspect, with a well-marked indurated base, and is accompanied with induration of the submaxillary lymphatic glands, the diagnosis may be made without much difficulty; but the signs and appearances are not always characteristic, and the diagnosis may be very difficult, the course of the case alone, perhaps, clearing it up.

Secondary syphilis, as is well known, rarely fails to manifest itself in the pharynx, the favourite seat of the lesions being the region of the tonsils. The earliest form of secondary syphilitic sore throat is described as a simple erythema. This is said to be characterized by the deep dusky redness and a well-defined margin. It may occur in patches, or as a diffuse uniform redness. It affects chiefly the mucous membrane of the faucial pillars, and soft palate, terminating usually at the junction of the hard and soft palate. How far this erythematous redness is really characteristic is perhaps doubtful, and in any case it is generally overlooked, as it produces little or no discomfort. Undoubtedly, the first really characteristic lesion usually observed consists in the appearance, about these parts, of areas, in which the epithelium presents a cloudiness or milky opacity, and the surface is more or less eroded. These

erosions are of a reddish or whitish opaline tint, and present a rounded or oval form, and vary in size from a lentil to an almond. The surface is smooth, or slightly raised (papular) in places. The erosions occur on the tonsils, faucial pillars, soft palate, or uvula, less often on the posterior wall, and frequently become confluent, so as to form an extensive patch, covering the tonsils and extending on to the anterior pillars and palate, with a well-defined curved or sinuous edge. Equally frequent and quite characteristic are the mucous patches, papules, or tubercles, which occur as bluish-white elevations of the mucous membrane, more or less rounded in shape, and of varying size. They appear principally on the tonsils, soft palate and its pillars, and uvula, and are often best developed on the anterior surface of the soft palate and anterior pillar. More rarely, distinct ulceration of the throat occurs in the course of secondary syphilis. The ulcers may occur on the site of the previous lesions, or independently. They are usually of limited depth. When occurring on the free edges of the pillars, they often cause these to assume a serrated, jagged outline. The tonsils are often considerably swollen in connection with the secondary lesions of their surface. A true syphilitic hypertrophy, independent of any other lesion, and comparable to the enlargement of lymphatic glands, at this period, has been described by Cornil and others. This hypertrophy is said to terminate rather rapidly by subsidence, in some cases, while in others it passes into a chronic condition.

The pain and dysphagia in connection with secondary throat lesions are usually slight, unless in severely marked cases. Although the secondary lesions tend in time to get well, they are exceedingly prone to relapse, and mucous patches may thus reappear frequently over a period of *several years* from the date of the commencement of the disease.

In the later or tertiary stage of syphilis, gummatous infiltration, and ulceration resulting therefrom, are very common in the

throat. The soft palate is especially attacked. Gummatous infiltration of the soft palate is usually more or less diffuse, though occasionally a circumscribed, well-defined tumour is observed. The stage of infiltration, however, more often than not, passes unnoticed, the ulcerative stage being alone observed. Ulceration often begins on the upper or naso-pharyngeal surface of the soft palate, remaining confined to that aspect for some time, and escaping observation unless the rhinoscopic mirror be used. In certain cases diffuse gummatous infiltration is succeeded by fibrotic induration and consequent deformity, without the occurrence of any ulcerative process.

The loss of substance which results from tertiary ulceration of the soft palate may present itself under three forms, as described by Fournier. In some cases a gap occurs at some portion of the edge of the soft palate, or of the pillar; in other cases a perforation occurs somewhere through the substance of the palate, very often in or near the median line; in a third set of cases, owing to a central perforation extending to the edge of the soft palate, or a loss of substance in the edge, extending inwards and becoming continuous with a perforation, the velum is divided into two portions, which are drawn apart from each other, curtain-like, by the action of the muscles, as in a congenital cleft.

Ulcers of a superficial character, not tending to perforate, but spreading in a serpiginous manner, are sometimes seen on the soft palate and faucial pillars, less often on the tonsils.

The posterior wall is not unfrequently the seat of well-defined rounded tumours, caused by circumscribed gummata. More or less extensive ulcers of the posterior wall of the pharynx often occur. Some of these ulcers originate in gummatous infiltration of the periosteum of the vertebral column, and may be complicated with disease of the vertebræ. Gummata and ulcers of the anterior (laryngeal) wall of the lower end of the pharynx may similarly originate in syphilitic perichondritis (cricoid).

The symptoms of tertiary syphilis of the pharynx are mainly pain or difficulty in deglutition. The pain and dysphagia are occasionally very severe, but as a rule they are not so. Indeed, the symptoms are often latent and insidious, and may excite little or no trouble, until suddenly perforation of the soft palate, with the accompanying nasal twang and regurgitation of fluids through the nose, calls attention to the gravity of the condition. Apart from actual perforation, marked infiltration of the soft palate, by interfering with its mobility, may cause a nasal voice and regurgitation of fluids.

As a result of syphilitic ulceration, more or less extensive scarring of the pharynx or a permanent perforation of the soft palate frequently remain. A common result of extensive ulceration is cicatricial adhesion of the soft palate, or such as remains of it, to the wall of the pharynx. The adhesion may affect one or both sides, and may be so extensive as to leave only a minute opening, such as would admit a pencil, between the pharynx and naso-pharynx. In rare cases there is complete occlusion of the passage.

Various disturbances of function may result from these deformities. The speech may acquire a nasal twang or be toneless and indistinct, respiration through the nose may be obstructed, smell and taste may be lost, and the hearing may be seriously impaired.

Contractions in the lower part of the pharynx are less frequent, but occasionally occur to such a degree as to interfere with respiration and deglutition. In one form, the pharynx is bridged over by a membrane passing from the posterior wall or lateral parts to the base of the tongue. A small aperture only may remain, through which the normal or altered larynx may be visible. Sometimes the edges of the epiglottis are adherent to the margin of the opening.

Treatment.—It is unnecessary here to enter into the treatment of syphilis. Only a few points need be noted.

The secondary syphilides of the throat are sometimes very chronic and obstinate, if general treatment alone be relied upon. On the other hand, by local application they can be made to disappear very rapidly. Among the many local applications recommended, are solid nitrate of silver, tincture of iodine, perchloride of mercury (gr. ii. to ʒi), acid pernitrate of mercury, etc. There is perhaps none better than a weak solution of chromic acid (gr. x to ʒi). This can generally be entrusted to the patient to paint on daily, and often causes disappearance of the most obstinate mucous patches in a week or two.

Local applications are sometimes useful in tertiary ulceration. Among those recommended are solid nitrate of silver, sulphate of copper, and tincture of iodine. Iodoform dusting is also often useful.

Adhesions and constrictions of the pharynx, resulting from cicatrization of tertiary ulcers, sometimes demand surgical interference, owing to impediments to respiration or deglutition. Partial adhesions of the soft palate are best left alone, but complete closure of the passage between the naso-pharynx and lower pharynx may give rise to such marked functional troubles as to indicate interference. When there is simple adhesion without much fibrous induration and contraction of the parts, surgical procedures are often successful in establishing a permanent opening. Where, however, the deformity is great, and, as in some cases, the whole of the back of the throat is converted into a thick fibrous mass, relapse is almost certain after any operation, and the very most that can be attempted is to establish an opening which the patient may keep patent by the constant use of bougies.

2. INHERITED SYPHILIS.

In the early period of inherited syphilis, in newly born and young infants, lesions of the mucous membrane of the pharynx often occur, exactly similar to those of the secondary

stage of acquired syphilis. Erythematous redness, cloudiness and erosion of the mucous membrane, and mucous patches occur in the region of the fauces, although, as is well known, this form of syphilis shows a more especial predilection for the nasal mucous membrane.

In the later stage of inherited syphilis the pharynx is attacked with comparative frequency. The soft palate is the most frequent seat of the disease, but the pillars of the fauces, tonsils, and posterior wall of the pharynx may be affected. The disease may occur at any age between four or five years and adult life, but is probably most common about the age of puberty. It assumes the same form as the tertiary lesions of acquired syphilis, namely, gummatous infiltration, which softens and leads to more or less extensive ulceration and destruction of the parts.

The course of the disease is often insidious at the onset, being unattended with pain or any symptom to cause alarm. Indeed it is not uncommon to find extensive cicatrization and other evidence of former ulceration without any definite history indicating the period at which the disease was active. When the soft palate is attacked, it often happens that the grave nature of the lesion is not recognized until the sudden occurrence of functional troubles, dependent on partial destruction or perforation of the organ, such as the regurgitation of fluids through the nose, and nasal intonation of voice. Adhesion of the pillars or soft palate to the pharyngeal wall, so as to partly or wholly occlude the passage between the naso-pharynx and lower pharynx, as well as other deformities, may arise, similar to those already mentioned as resulting from acquired syphilis.

XX. LUPUS AND TUBERCULOSIS OF THE PHARYNX.

LUPUS.—Lupus rarely begins in the pharynx, being, as a rule, secondary to lupus of the face and nasal fossæ. It is most commonly met with in young subjects, about the age of puberty. Its favourite seat is the soft palate and faucial pillars, but it often affects the tonsils and posterior wall of the pharynx.

The disease usually appears, in the early stage, in the form of opaline points, or small granules or nodules, from a pin's head upwards in size, on a more or less reddened mucous membrane. In course of time the nodules increase in number, and some of them break down into little pit-like ulcers. The surface of the soft palate often assumes a rough and worm-eaten appearance. The edges of the faucial arches become thickened, irregular, and serrated. In some cases the thickening and nodular condition of the parts is the chief feature. In others, ulceration is predominant. In some cases the ulceration is very slight and superficial. In others the small pit-like ulcers run together into serpiginous areas of ulceration, and, extending in depth, may lead to considerable destruction of the parts. Adhesion of the posterior pillars and the pharyngeal wall, on one or both sides, is a very common result of lupus.

The symptoms are often not marked. Usually there is only moderate discomfort, increased by deglutition or contact with irritating substances. Functional troubles affecting speech or deglutition may be present in advanced cases, in consequence of destruction or deformity of the parts.

The diagnosis from syphilis is sometimes difficult. The patients are mostly young, but the possibility of inherited syphilis has to be borne in mind. Generally the presence of lupus on the external parts enables the diagnosis to be made, but when lupus is confined to the throat, difficulty may arise. As a rule, the course of lupus is much slower than that of syphilis, and the bony structures are not involved. Ulceration proceeds much more slowly; there is a very gradual eating away of the parts, different from the sudden softening and breaking down of a gummatous infiltration. A clean-cut, perforating ulcer in the soft palate is characteristic of syphilis. Even where, at the time the case is first seen, there is extensive ulceration present, it is usually easy to recognize at other parts the characteristic granular or nodular appearance of lupus. Small disseminated ulcers are more characteristic of lupus, whereas a single large ulcer is more frequently the result of syphilis. In doubtful cases the administration of iodide of potassium, with or without mercury, must be resorted to.

Treatment.—General treatment on the usual lines is, of course, indicated. Arsenic and cod-liver oil are especially useful. Many cases improve considerably or undergo complete cure on general treatment. On the other hand, relapses are common after almost complete recovery. Local treatment is always useful. Scraping the parts with a curette always does good. Lactic acid, pure, or in a 50 to 80 per cent. solution, applied on a firm mop of wool, with a certain amount of friction, is the best local remedy.

TUBERCULOSIS.—Tuberculosis of the pharynx, excluding, of course, the epiglottis and parts about the laryngeal orifice, is rare, and its rarity contrasts especially with the frequency of laryngeal tuberculosis. When it occurs, it is almost always associated with marked pulmonary tuberculosis. This, however, is not invariable, and cases of primary pharyngeal tuberculosis have been met with. The disease has mostly been observed in adults. It may attack any part of the pharynx—

the soft palate, the tonsils, or posterior wall. It rarely comes under observation, except in the stage of ulceration.

Pain is almost always a prominent symptom of tuberculous ulceration of the pharynx. It is especially excited by deglutition, and may radiate towards the ears, and be so severe as to render the taking of nourishment extremely difficult. There is sometimes considerable fetor of the breath. The lymphatic glands in the neck usually enlarge. The general symptoms of tuberculosis are present, varied in degree and character according to the extent of the disease in the lungs, or larynx, or elsewhere.

Miliary tubercles have been, in exceptional cases, observed on the soft palate, or elsewhere, before the appearance of ulcers. The ulcers are usually lenticular in shape, rather superficial, with a dirty pale-yellow base, and irregular edges, surrounded by congested mucous membrane. Considerable tumefaction of the neighbouring parts is sometimes present. In the vicinity of the ulcers, grey and yellowish miliary nodules may appear, which ultimately break down. By confluence of neighbouring ulcers extensive areas may be affected. Granulations may appear in the base of the ulcer, sometimes in proliferating masses.

Even when the disease is apparently primary, it rarely fails, within a few months, to manifest itself in the larynx, to which it may also spread by continuity, in the lungs, or elsewhere, and thus speedily terminate fatally. Nevertheless, a few cases of cicatrization and ultimate cure of the disease have been recorded.

Tuberculous ulcers may be confounded with syphilis. Where the typical lenticular ulcer is present, with tuberculous nodules in the base or vicinity of the ulcer, and evidences of tuberculosis in other parts are forthcoming, little difficulty will be experienced. As a rule, the ulcer is much less extensive than is so commonly met with in syphilis; it is also shallower, and the course is slower and more chronic. Pain is a more

prominent symptom in tuberculous ulceration. A microscopical examination of a scraping from the ulcer may show tubercle bacilli and so establish the diagnosis. The effect of specific treatment will clear up the diagnosis in doubtful cases.

Treatment.—It is unnecessary here to enter into the general treatment of tuberculosis. In most cases of pharyngeal tuberculosis the general condition and complications are such that little can be hoped for from local treatment beyond the relief of the pain and discomfort. For this purpose insufflation of morphia (acetate of morphia, gr. $\frac{1}{6}$, starch powder, gr. 1) will be found useful. Insufflations containing iodoform, boric acid, and morphia may also be used. Cocaine, sprayed or painted on the throat before administration of food, is very useful.

When the condition of the lungs is such as to encourage more energetic treatment, lactic acid may be applied to the surface of the ulcer, with or without a previous scraping, in a solution varying in strength from twenty to eighty per cent., according to the tolerance of the patient. The solution is best applied on a pledget of lint, and with a certain amount of friction. The application is repeated at intervals of two or three days or longer, depending on how it is borne. It is generally painful, so that it is advisable to apply cocaine first. A twenty per cent. solution of menthol in olive oil is also said to have a beneficial effect on tuberculous ulcers, and to promote their cicatrization.

XXI. NEUROSES OF THE PHARYNX.

1. SENSORY AFFECTIONS.

Anæsthesia of the pharynx may be partial or complete, and may affect one or both sides. The commonest cause is hysteria, and this symptom will often be found accompanying hysterical aphonia and aphasia. The next commonest cause is diphtheria, and in this case the anæsthesia is generally associated with motor paralysis in this region.

Central lesions involving the origin of the glosso-pharyngeal or pneumogastric nerves, such as tumours, hæmorrhages, bulbar paralysis, etc., are sometimes the cause of anæsthesia of the pharynx. It is also observed not unfrequently in general paralysis of the insane.

Anæsthesia of the pharynx in most cases causes no symptoms. Sometimes, and principally when it first develops, there may be a numb feeling, and some dysphagia, owing to the passage of food into the larynx, especially if the larynx is itself anæsthetic.

Hyperæsthesia is often observed in association with chronic congestion or catarrhal affections of the pharynx. It may also be of hysterical origin. Sometimes the least contact of an instrument is actually painful; more usually hyperæsthesia is evinced by increased reflex irritability.

Paræsthesia of the pharynx includes various sensory troubles, which cannot be accounted for by the local conditions. The sensations complained of by different patients are very varied. Thus there may be a burning, pricking, or itching

feeling in some part of the throat, or a feeling of dryness. A sensation of a foreign body may be complained of, and it may be likened to a ball (*globus hystericus*), a skin, a fish-bone, a needle, sand, etc. A feeling of tension, constriction, or closure of the throat may be complained of. These various paræsthesiæ occur chiefly in nervous, hysterical, hypochondriacal, or dyspeptic subjects, and more frequently in women than in men. They are common in women about the climacteric period. They are also rather apt to occur in persons who use their voice much. They sometimes originate as a sequel to some inflammatory affection of the throat or the removal of a foreign body.

The diagnosis of paræsthesia of the pharynx is by no means always easy. Obviously, before making a diagnosis, the throat must in every instance be carefully examined in order to exclude the presence of any lesion which might produce the sensation complained of. It has already been mentioned in other sections of this work, that sensations like those just described are complained of by persons suffering from hypertrophied lingual tonsil, chronic lacunar tonsillitis, granular pharyngitis, etc. But even where these lesions are found, we cannot at once conclude that the sensation depends upon these, and that local treatment will effect a cure. This applies more especially to cases where the patient is of a nervous temperament. Moreover, if treatment of some local lesion, especially if it be of an energetic character, such as the electric cautery, is followed by a cure of some troublesome sensation, it does not necessarily follow that the sensation really depended on the local affection. Energetic local applications are well known to be occasionally followed by relief of paræsthesiæ of a hysterical nature in other regions of the body as well as the throat.

Paræsthesiæ of the pharynx are sometimes very chronic, lasting in some cases, usually with remissions and exacerbations, for many years.

Neuralgia of the pharynx is occasionally met with chiefly in females. The patients, without exhibiting any lesion, or at most a slight redness of one side of the pharynx, complain of severe darting pains in the throat, which occur in paroxysms. The pains generally start from one or other side of the back of the throat and radiate upwards towards the palate, or into the ear or tongue. Sensitive spots may sometimes be found in these cases, externally near the great cornu of the hyoid bone, or in some part of the throat.

2. MOTOR AFFECTIONS.

Paralysis of the pharynx may affect the muscles of the soft palate and the pharyngeal constrictors simultaneously, or each of these sets of muscles may be affected independently of the other. The commonest cause of paralysis of the palate muscles is diphtheria. The paralysis is often incomplete, and usually affects either one side only, or one side much more than the other. Diphtherial paralysis much more rarely affects the constrictors of the pharynx. Central lesions of various kinds may cause paralysis of the constrictors and palate muscles, the principal of these being progressive bulbar paralysis. Paralysis of the soft palate is sometimes observed in locomotor ataxy. Impairment of movement of the palate muscles, due to serous infiltration or inflammation of the muscles, is sometimes observed as a result of acute and chronic inflammatory affections in this region.

The symptoms of paralysis of the soft palate are characteristic, and affect phonation, deglutition, and hearing. Owing to the non-elevation of the soft palate and consequent escape of air through the nose, the voice is nasal, and speech is indistinct, the formation of the explosive labials *b* and *p* being interfered with especially. In swallowing, fluids are forced up into the naso-pharynx, and may pass out of the nose. This trouble is more marked at the commencement of the case, the patient

appearing to be able by attention to avoid this later on. Some impairment of hearing may result from the non-action of the muscles attached to the Eustachian tube. When one side only of the soft palate is affected the symptoms are much less marked, or may be absent.

On inspection, if the paralysis is complete, the soft palate hangs inert, the uvula hangs down loosely, and is merely drawn backward, and thrown forward, by the current of air at each inspiration and expiration. There is no movement visible on phonation, or when the surface is directly irritated. When paralysis is unilateral the uvula lies nearer to the sound side, the arch of the velum on the paralyzed side is lower, and wider than on the sound side. The appearances, while the palate is at rest, however, are not to be depended upon. Differences in the arches on the two sides and obliquity of the uvula are sometimes present in health. On phonation the condition is ascertained with greater certainty. The palate is raised on the sound side only, and there is some drawing of the palate towards the sound side.

Paralysis of the constrictors causes difficulty or impossibility of swallowing food, the difficulty commencing as the food passes the isthmus faucium, and being proportionate to the degree of paralysis. The food sticks about the root of the tongue. Fluid or semi-fluid food passes into the œsophagus by its own weight; and as paralysis of the muscles which shut off the larynx often coincides, fluids may enter the larynx, causing coughing and choking. Paralysis of the superior constrictor allows fluids to return through the naso-pharynx and nose, but it is doubtful whether this occurs unless the soft palate is also paralyzed (*Gowers*). If the paralysis is unilateral the dysphagia is much less marked.

Spasm of the muscles of the throat may affect the muscles of the soft palate or the constrictors of the pharynx. Clonic rhythmical spasms affecting the soft palate are occasionally observed affecting certain muscles only, or all the muscles of

the palate. At each contraction the palate is raised and made tense, while at the same time the Eustachian orifices are opened, causing the patient to experience a clicking sound. This sound can be heard by the observer if his ear is connected with the patient's by an auscultation tube. These spasmodic movements of the soft palate have been observed sometimes in association with facial spasm, and the movements have been sometimes synchronous with the face, sometimes not.

Apart from such diseases as hydrophobia and tetanus, in which tonic spasm of the constrictors of the pharynx is observed, spasm of these muscles is met with only as a functional trouble. The subjects are usually hysterical. Spasmodic contraction of the constrictors is sometimes observed in nervous subjects suffering from acute or chronic pharyngitis. Cases of clonic spasm of the pharynx, consisting of lateral rhythmical movements of the posterior wall (nystagmus of the pharynx), have also been observed. Rhythmical movements have also been observed affecting simultaneously several groups of muscles, such as those of soft palate, pharynx, larynx, and neck.

Treatment.—The treatment of the preceding affections must be directed almost wholly to the various conditions on which they depend. A few remarks, therefore, will suffice.

It is almost needless to say that the topical application of cocaine is invaluable in facilitating the examination and local treatment of the throat where hyperæsthesia exists. Cocaine will often remove various paræsthesiæ, but its effects are of course transitory. Antipyrine applied to the throat in strong solutions (thirty to forty per cent.) has been found useful in removing paræsthesiæ, its effects being more prolonged than cocaine, and it has been credited with completely curing certain cases (*Coupard, Saint-Hilaire*). The administration of the bromides in full doses is often useful in certain cases of hyperæsthesia and paræsthesia. In cases of paræsthesia, however, the treatment of the general condition

of the patient is of the utmost importance, and must never be omitted. It is probable that local treatment in these cases often increases the trouble by concentrating the patient's attention still further to the throat. In the absence, therefore, of definite lesions, we should generally do well to refrain from all forms of local treatment.

In hysterical spasmodic dysphagia the regular passage of an œsophageal bougie will often be of service in combination with the general treatment. In cases of complete dysphagia from any of the above-mentioned causes, feeding with the stomach tube will of course be necessary.

Treatment has little influence on the various rhythmic movements above mentioned. Bromides have sometimes appeared useful.

XXII. FORMULÆ.

THE following formulæ are examples of those which are found useful in the local treatment of diseases of the nose and pharynx. Most of them may be altered in strength and composition to suit particular cases, and other combinations of a similar character will suggest themselves. The rules and principles which guide their application are contained in various sections of the work. It may be remarked that, as a general rule, the weaker strengths are more suitable for the nose, and that solutions which are to be introduced into the nose should be used slightly warm.

1.

R. Sodii Bicarb.
 Boracis āā gr. iii-v
 Aquæ ʒi

An alkaline cleansing solution, used as a spray, douche, or gargle in chronic rhinitis, atrophic rhinitis, chronic pharyngitis, etc. When a large quantity is needed, as for the douche, it is convenient to prescribe equal parts of bicarbonate of soda and borax, in bulk, and direct a couple of drachms to be added to each pint of warm water.

2.

R. Sodii Bicarb.
 Boracis āā ʒss
 Sacch. Alb. ʒi

A teaspoonful (not piled up) to be dissolved in half a pint of warm water. Useful as a collunarium in chronic rhinitis, chronic nasopharyngitis, etc.

3.

R. Sodii Bicarb.
 Boracis
 Sodii Chlorid. āā gr. vii
 Sacch. Alb. gr. xv

This powder, dissolved in about half a tumbler of tepid water, forms the "compound alkaline wash" referred to in the work. (Morell Mackenzie's formula.) Used with the spray-producer, douche, or syringe, in chronic rhinitis, atrophic rhinitis, chronic pharyngitis, etc. The powder may be often more conveniently prescribed in bulk, with directions to dissolve a teaspoonful in a tumbler of warm water.

4.

R. Sodii Bicarb.
 Boracis
 Polassii Chloratis āā ʒss
 Sacch. Alb. ʒi

A teaspoonful to be dissolved in a tumbler (half a pint) of warm water. Useful as a collunarium or gargle in various catarrhal conditions.

5.

R. Sodii Bicarb.
 Boracis āā gr. vi
 Glycerini Acidi Carbol. ʒxii
 Aquæ ʒi

"Dobell's Solution." An alkaline disinfecting lotion, useful as a spray in chronic rhinitis, atrophic rhinitis, etc.

6.

R. Acidi Borici
 Boracis āā gr. v-xx
 Aquæ ʒi

A cleansing, disinfecting solution, useful in various diseases of the nose and throat. (As boric acid, with an equal part of borax, is much more soluble than boric acid alone, and equally antiseptic, the solution can be made, if desired, much stronger than the above, up to a drachm or more of each to the ounce

of water.) Equal parts of boric acid and borax may be conveniently prescribed, mixed in the form of powder, with directions to dissolve a teaspoonful in a tumbler of water.

7.

R. Potass. Chlorat. gr. x-xv
 Aquæ ζ i

Slightly disinfecting and stimulating gargle.

8.

R. Potass. Chlorat. gr. xx
 Acidi Hydrochlorici (pur.) η xv
 Syrupi Simplic. ζ i
 Aquam ad ζ vi

The constituents of a "chlorine gargle," to be made as follows: Mix the chlorate of potash and hydrochloric acid in a bottle. The evolution of gas is hastened by shaking the corked bottle. Then gradually add the water, little by little, shaking the bottle each time, so that the gas is dissolved and not displaced from the bottle. Add the syrup before use. A disinfecting gargle useful in diphtheria, and various ulcerative diseases of the throat.

9.

R. Acidi Carbolicus gr. iv
 Aquæ Calcis ζ i

Antiseptic gargle recommended in diphtheria.

10.

R. Liq. Hydrarg. Perchlor. ζ i
 Glycerini ζ i
 Aquam ad ζ i

Antiseptic gargle. Other formulæ for disinfecting gargles are: Liq. Potass. Permang. η ii, Aquæ ζ i; Liq. Sodæ Chlorinatæ ζ ss, Aquæ ad ζ i.

11.

R. Acidi Tannici gr. x-xx
 Aquæ ζ i

Astringent spray or gargle. It may be made with Glycerinum Acidi Tannici ($\frac{1}{2}$ –1 dr. to ζ i). Other astringent formulæ are : Aluminis gr. viii, Aquæ ζ i; Acidi Tannici, Aluminis $\bar{a}\bar{a}$ gr. vi, Aquæ ζ i. Any of the preceding may be agreeably made up with Acid Infusion of Roses instead of Water, for a gargle.

12.

R. Tinct. Iodi η iiss
Sodii Chloridi gr. v
Aquæ ζ i

Gargle, recommended to be used at frequent intervals in inflammatory, ulcerative, and diphtheritic sore throats.

13.

R. Iodi gr. x
Potass. Iodid. gr. xx
Glycerini ζ i

Iodo-glycerine solution, useful in chronic pharyngitis, etc. Stronger solutions, containing fifteen and twenty grains of iodine and thirty and forty grains of iodide of potassium respectively, are also used. Schech recommends the addition of oil of peppermint (η iii to ζ i), for its anæsthetic effect on the mucous membrane.

14.

R. Iodi
Potass. Iodid. $\bar{a}\bar{a}$ gr. xc
Aquæ ζ i

Strong solution of iodine recommended for granular pharyngitis, etc.

15.

R. Thymol gr. $\frac{1}{2}$ –gr. i
Spir. Vin. Rect.
Glycerini $\bar{a}\bar{a}$ ζ ss
Aquam ad ζ i

A stimulant antiseptic spray, recommended in ozæna.

16.

R. Menthol gr. v-x
Paraffini liquidi ℥i

Useful as a spray in various irritable and catarrhal conditions of the nasal mucous membrane. Other liquid paraffin preparations, known in commerce as paroleine, glymol, etc., may be substituted in this and the following formulæ for the pharmacopœial preparation.

17.

R. Menthol gr. iii-vi
Camphoræ gr. ii-iv
Paraffini liquidi ℥i

Similar to the preceding.

18.

R. Menthol gr. x
Eucalyptol ℥ x
Paraffini liquidi ℥i

Antiseptic nasal spray. Five grains of carbolic acid may be added to the above if desirable.

19.

R. Morph. Hydrochlorat. gr. ii
Pulv. Acaciæ ℥ii
Bismuthi Subnit. ad ℥i

“Ferrier’s Snuff.” Used as a snuff, or insufflation, in acute rhinitis.

20.

R. Cocain. Hydrochlorat. gr. v
Menthol gr. i
Bismuthi Subnit. ℥ii

Recommended as a snuff, or insufflation in acute rhinitis.

21.

R. Acidi Tannici gr. x
Pulv. Camphoræ ℥i
Pulv. Amyli ad ℥i

Insufflation, used in chronic rhinitis and naso-pharyngitis.

2 F

22.

R. Acidi Salicylici gr. xl
Magnesiæ Pond. ʒi

Stimulating insufflation, recommended in atrophic rhinitis and some forms of chronic rhinitis.

23.

R. Pulv. Eucalypti Gummi ʒi
Pulv. Amyli ʒii

Insufflation, used in chronic rhinitis, atrophic rhinitis, etc.

24.

R. Pulv. Sanguinariæ vel Pulv. Galangæ ʒii
Pulv. Amyli ad ʒi

Recommended by Bosworth as a stimulant in atrophic rhinitis.

25.

R. Pulv. Iodoformi ʒi
Pulv. Acidi Borici ʒi

A disinfecting and deodorizing insufflation, useful in atrophic rhinitis, syphilitic ozæna, etc. Iodol, aristol, or europhen may be substituted for iodoform, and they have the advantage of being free from odour. Any of them may be insufflated pure without the admixture of boric acid.

26.

R. Acidi Carbol. ʒss
Liq. Ammon. Fort. ʒss
Spir. Rectificat. ʒi ss
Aquæ Destillat. ad ʒiii ss

Hager and Brand's "Anticatarrhal Remedy," referred to in the section on acute rhinitis.

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